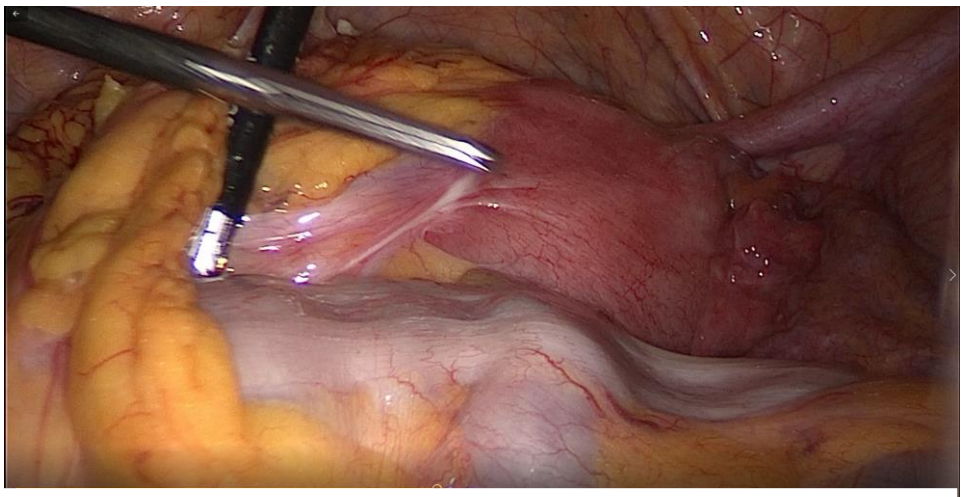
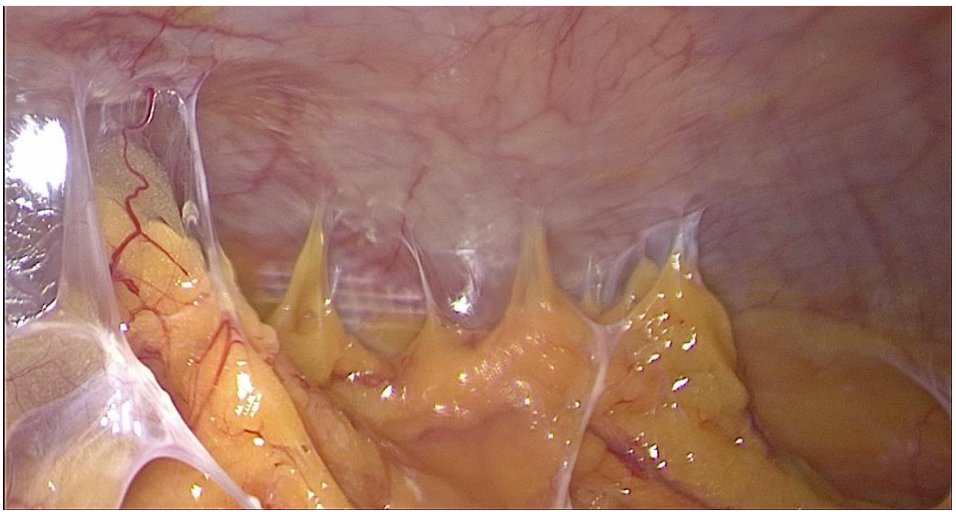
the Trocar
Official Online Journal of ISGE





ISSUE 3 Volume 3 (September 2022)

Published by ISGE ISSN: 2736-5530

Dear Readers,

after 2 years we have now compiled the eighth issue of thetrocar and we hope to be registered on pubmed soon. All articles are DOI registered from the beginning, but a pubmed listing will significantly increase our visibility and the impact of your articles. ISGE has thus managed to substantiate its scientific work. We are very pleased that we have been able to revive the legacy of Ornella Sizzi and Alfonso Rosetti so successfully. Thanks again to everyone who supports us and to the authors who have worked with a lot of energy on their articles.

After being blocked by the pandemic, we resumed our accreditation program this year and successfully certified new colleagues. ISGE is a growing family and we welcome with open arms all those who want to work for the further education of colleagues and the improvement of patient care worldwide with open arms. This year we held our "intensive week" in Cameroon and Jamaica and successfully certified numerous new colleagues. We will continue the program in Italy in October.

In times of nationalist currents in many parts of the world, our work shows that people can work and think internationally and multiculturally. In addition, our work proves the value of ISGE's boundless orientation and we are happy about all those who join us and contribute to a better future with voluntary work.

There is still a long way to go. Even if the economic crises, the threat of energy problems and the climate crisis unsettle all people, we should continue our work right now and let as many colleagues participate as possible. Still in 2022, the majority of humanity has no access to surgical care and certainly not to minimally invasive surgery. Help us to make a contribution to improve this situation.

Yours

Günter Noé

Editor in Chief

President ISGE

Index: Issue 3 Volume 3 The Trocar — September 2022

The frontpage shows adhesions after pelvic infection (1) and adhesions after laparoscopic hernia mesh repair (2)

THE INTERNATIONAL SOCIETY FOR GYNECOLOGIC ENDOSCOPY
PROMOTING VAGINAL SURGERY

the Trocar
Official Online Journal of ISGE

TheTrocar Issue 3 Volume 3 / Page 1-21 ISSN: 2736-5530

Adhesions: The Underestimated partner in Surgery: has there been progress in understanding adhesion formation and treatment over the last 30 years (ISGE Recommendation for prevention)

Author: Bruno J van Herendael[1] Daniel Kruschinski[2]

Affiliation:
[1] Ziekenhuis Netwerk Antwerpen ZNA Stuivenberg, Antwerp Belgium – Università dell'Insubria Varese Italy, ISGE Adhesion Taskforce

[2] Kruschinski Medical Center, Frankfurt, Germany, ISGE Adhesion Taskforce

Abstract

Manipulating tissues during surgical interventions causes adhesions. Some tissues and some patients are more prone to form adhesions. When cross linked fibrin is not broken down by the activation of plasminogen to plasmin there remains a fibrin clot causing the adhesion (Tab 1). The incidence of adhesions in open surgery is estimated at an average of 85% in literature. Readmission due to Adhesion Related Disease (ARD) (1) is evaluated at 5% - 10%. Laparoscopy is comparable to laparotomy. Gynaecological surgery patients are seen back by the gynaecologist only in 52% of cases, 26% is seen in general surgery and 14% in urology. Surgery of the ovaries is most at risk (48,1%) followed by fallopian tube surgery (41,2%), uterine surgery (32,1%). Endometriosis surgery has an adhesion incidence of 82% followed by tubal surgery and adhesiolysis 76%, ovarian surgery 75% and myomectomy 68%. Recent investigations have suggested that good surgical technique combined with adhesion barriers does reduce the incidence of adhesions. In laparoscopy and laparotomy meticulous surgical technique is very important. All residual blood has to be rinsed off, preferably with Ringer's lactate combined with the appropriated amount of heparin, diluted and aspirated this after meticulous haemostasis. When possible monopolar and bipolar energies should be replaced by ultrasound or laser (CO2 laser) energy. Using floatation barriers seems not to have an influence on adhesion formation. Gel barriers have a significant effect on adhesion formation as documented by second look laparoscopies. Sheets do prevent adhesions. Using NSAID and corticosteroids in preventing postoperative pain as to help early ambulation after surgery are mainstay in surgery and should be endorsed in the policies to prevent adhesions.

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

Keywords: Adhesion, prevention, recommendation, hysteroscopy, laparoscopy.

Introduction

Adhesions and its synonym synechiae (Greek for continuation) are constituted of fibrous band between organs and are one of the underestimated problems complicating the postoperative phase of surgery (Fig 1). Liakakos et al found adhesions to be present in more than 90% of patients after open abdominal surgery and in 55% - 100% of women after pelvic surgery.

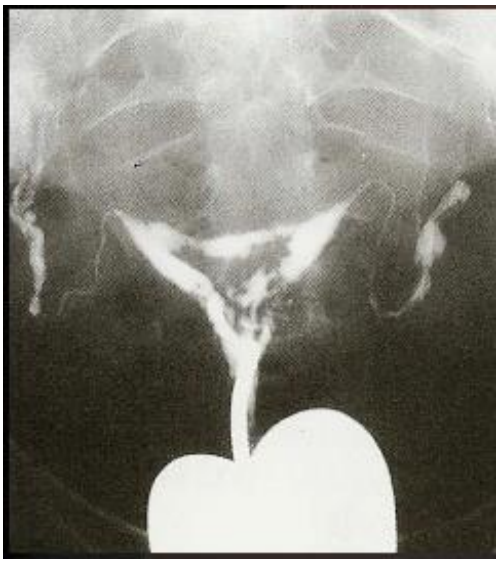


Fig 1: The classical image of Intra Uterine adhesions (synechiae) at hysterosalpingography.

The trauma inflicted to the peritoneum starts the process leading to adhesion formation (2) (Fig 2 a-b). In a large study Ellis et al on 29.790 patients, found that 35% of the patients had to be readmitted, twice on average, to the hospital after open abdominal or pelvic surgery due to Adhesion Related Disease (ARD) (1). More than 22% of readmissions did occur within the first year after the initial surgery. The Surgical and Clinical Adhesion Research study (SCAR) stated that the readmission rate over a period of ten years was 5% for open surgical procedures in gynaecology (3). 40% of the patients with ADR have been readmitted two to even five times. The overall number does suggest that a great number of adhesions do not cause clinical symptoms.

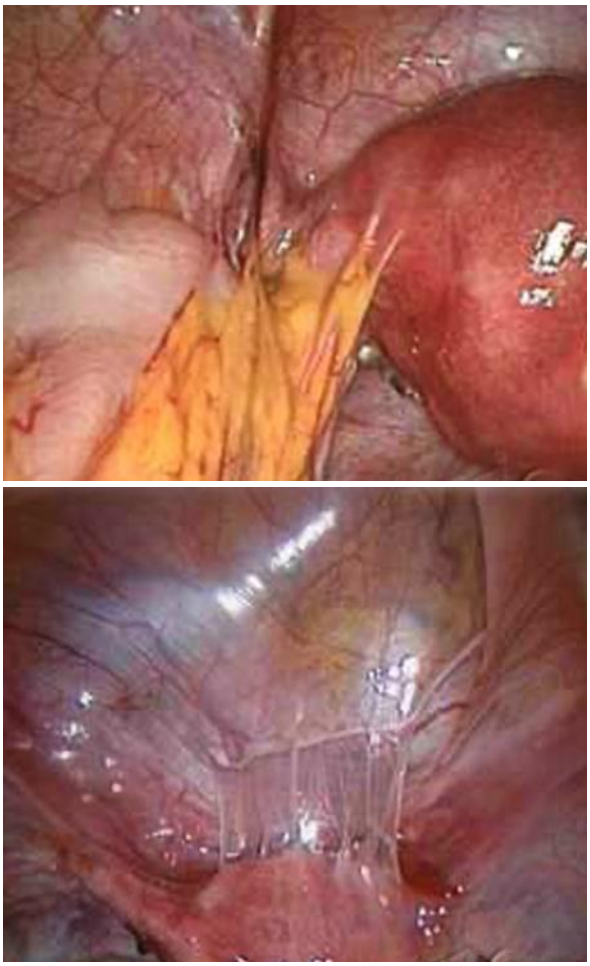
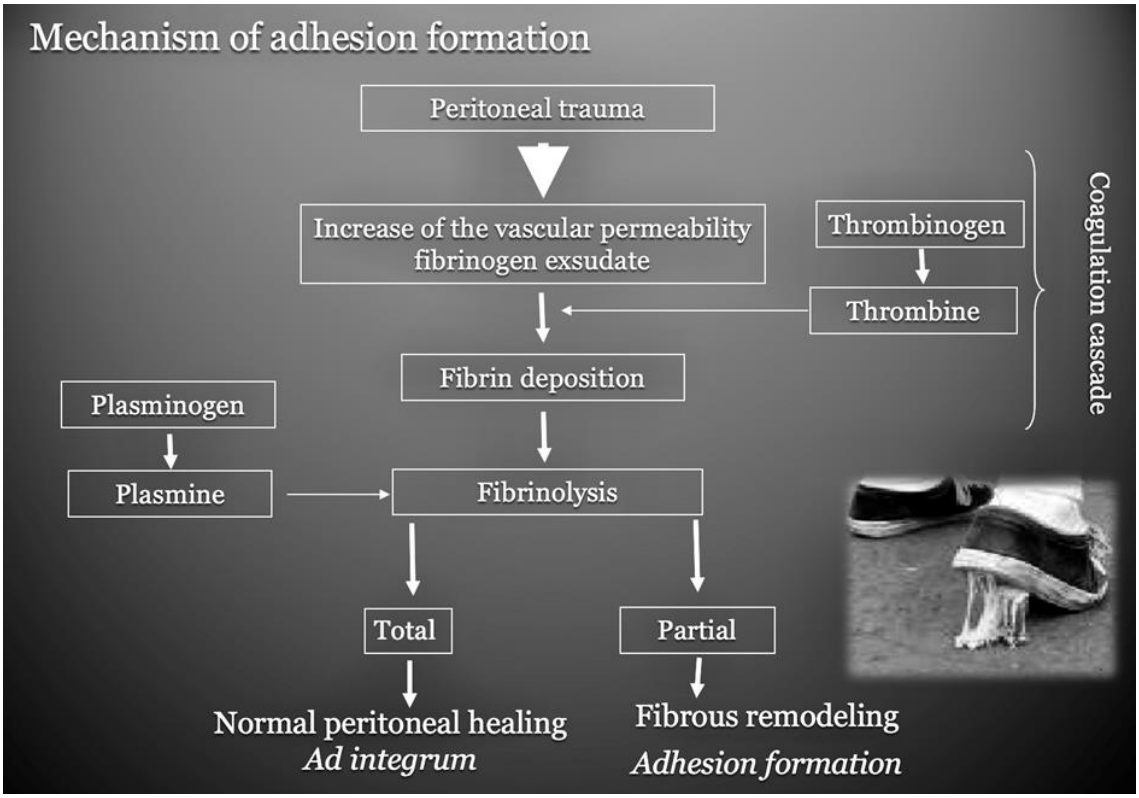


Fig. 2 Classical appearance of post operative adhesions, due to peritoneal damage by previous laparoscopic fertility surgery, at second look laparoscopy

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022



Tab 1 The Coagulation cascade in a nutshell

Intra Uterine Adhesions (IUA) are strings of fibrous tissue connecting opposite walls of the uterine cavity. IUA are found after control hysteroscopy in 31,3% after myomectomy, 6,7% after septectomy and 3,6% after polypectomy (4) There is a conundrum in denominations Asherman's syndrome (Joseph Asherman 1889 – 1968) (5). He does refer first to a complete occlusion and stenosis of the cervical os, with as consequence amenorrhea but with atrophic endometrium in the cavity whilst the second syndrome is IUA characterized by painful, reduced menses and secondary infertility. Both syndromes are described after trauma in the uterine cavity under influence of pregnancy hormones. In both syndromes there is a dysfunctional endometrium more pronounced in the first syndrome (Mark Hans Emmanuel, personal communication 2021) The time to complete intrauterine wound healing is patient dependent and depends on the type of surgery. Full postoperative, healing of the uterine cavity was achieved after hysteroscopic polypectomy in 86% (23/37 women), adhesiolysis in 67% (30/45 women), metroplasty 19% (3/16 women) and myomectomy 18% (12/65 women $p<0.05$). Metroplasty seems to cause more de novo adhesions 88% (3/16 women) and adhesiolysis 76% (33/45 women) as compared to myomectomy at 40% (26/65 women) or polypectomy at 0% (0/37 women). Overall women with de novo IUA did have difficulties in achieving complete endometrial integrity compared to women with no de novo adhesions 31% (23/74 women) versus 61% (54/989 women) $P=0.0003$. Yang et al conclude that complete healing is achieved in a range from one to three

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

months following polypectomy and myomectomy (6).

ISGE suggests to use these data to discuss the IUA problem with the patients undergoing hysteroscopic surgery. (Recommendation II-1/A)

1. Clinical significance of post-operative adhesions

A) Laparoscopy

The complications will depend on the organs afflicted by the adhesions meaning the location of the adhesions in most cases these will cause chronic pelvic pain, bowel obstruction and infertility (2 – 3)

The complexity of abdominal entry in an ARD abdomen adds significant risks to subsequent surgical reinterventions (7-8)

B) Hysteroscopy

IUA are symptomatic through menstrual abnormalities (amenorrhoea, hypo-menorrhea, Irregular bleeding). In patients taking oral contraception and/or hormonal therapy these symptoms can be masked. The latter are also masking possible pelvic pain and dysmenorrhea. Reproductive outcome is poor the prevalence is estimated at 43% (922/2151 women) (9). Recurrent miscarriages occur in 5% - 39% of women with IUA (10). An unexpected but very serious problem are the obstetrical complications like placenta accreta/increta, risk of preterm delivery, peri partum hysterectomy due to uterine rupture (11).

2. Pathophysiology

A) Hysteroscopy

Interference with the endometrial lining both by blind procedures like tissue sampling and or curettage, especially post abortion or postpartum (90%) (12) and hysteroscopic procedures can cause IUA. Genital tuberculosis does create IUA but the etiologic importance in the creation of IUA by other forms of endometrial infections is to be proven. The mechanism of restoration of the endometrium are still poorly understood (13).

B) Laparoscopy – Laparotomy – Gasless laparoscopy

I. Classical Model: local phenomenon between opposing lesions

Damage to peritoneal surfaces induces a response starting with an acute inflammatory reaction, and a process involving mesothelial cells, macrophages, exudate with cytokines and coagulation factors, neutrophils and leukocytes (14).

Within hours a peritoneal defect (i.e., caused by a trauma during surgery) is covered with macrophages and mesothelial cells (15). In the circumstances that mesothelial cells are able to cover the lesions fibrinolysis will start and after a few days this will result in re-epithelialization and a smooth surface without IUA. When fibroblast do invade the fibrin clot these will start to grow and proliferate and start to form IUA.

II. Adapted model: the role of the peritoneal cavity (16).

Free floating mesothelial cells are present at all times and their number increases twelve times within in two to five days after injury (17). When extensive lavage is performed at the time of surgery a substantial number of these cells are

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

removed slowing down the natural healing (18). CO2 gas is used to distend the abdominal cavity in laparoscopy this does interrupt homeostasis the same with room air in laparotomy and gasless laparoscopy influencing the mesothelial cells (Tab 2). The direct relation between CO2 insufflation, acidification of the peritoneum and decreased immunoprotection might thus result in an altered adhesion formation (19) (Fig. 3–4). Identified so far is hypoxia of the mesothelial cells due to CO2 pneumoperitoneum. Desiccation of cells, by CO2 pneumoperitoneum and tissue manipulation, have been demonstrated to increase adhesions and this increase is time- and pressure-dependent (20-21).

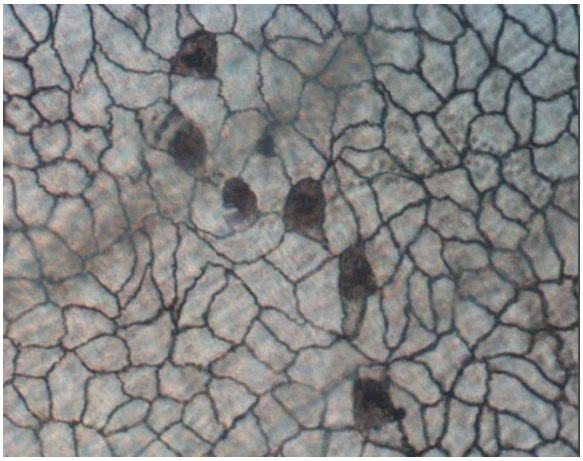


Fig 3 Scanning electron microscopy of the simple squamous epithelium at 37° Celcius and relative humidity of 95%. Visible are the free floating mesothelial cells (dark entities) (Douglas E Ott)

In gasless laparoscopy care has to be taken not to compromise the anterior peritoneum by pressure of the lift system (22).

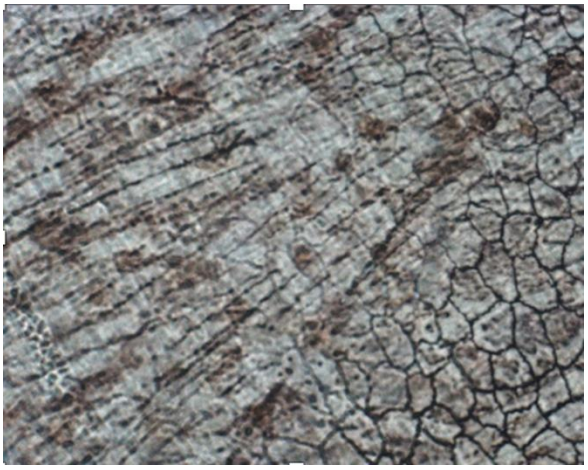
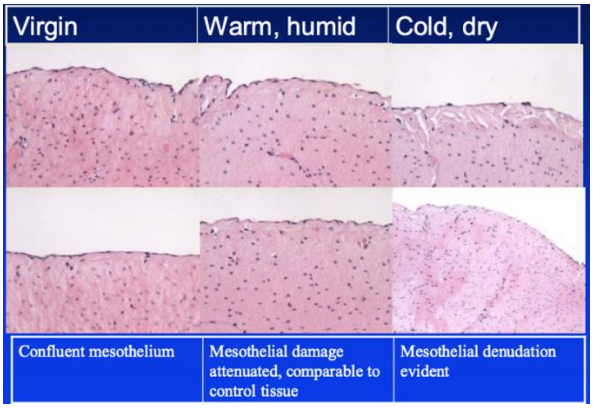


Fig. 4 Scanning electron microscopy of the peritoneal damage caused by CO2 flow at 10 lit/min direct exposure. The 60 □ protective peritoneal fluid film has been blown away and the relative humidity has been reduced together with the reduction in temperature. The combination of these factors does cause the monolayer of squamous cells to dry out. (Douglas E. Ott)



Tab 2 The appearance of the peritoneum, squamous cell layer, loose connective tissue and mesothelium under different circumstances. Courtesy of Douglas E. Ott Mercer University

3. Prevention of adhesions in hysteroscopy

A) IUCD

In the literature there is no evidence that IUCD prevents IUA formation. The physical barrier of

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

the IUCD is not proven as the uterine cavity is a virtual cavity and hence separation of layers is only present at the specific position of the IUCD. This means that small T shaped IUCD's have little to no impact. The IUCD should be very large in surface (23). The other effect of the IUCD is that, as a foreign body, it genders an inflammatory response in the endometrium responsible for a negative effect on the recolonization by the endometrium at the impaired surface (24). The progesterone IUCD's suppress the endometrium and are therefore not to be used. The blind introduction of an IUCD after a major hysteroscopic procedure, adhesiolysis, septectomy or myomectomy represents a major risk of infection and perforation (25-26).

The only small RCT does not show difference between the use of only an IUCD and hormonal therapy or a hormonal therapy alone (27).

ISGE recommendation: there is no evidence that IUCD's do reduce IUA formation. Stage 1: A

B) Barriers

The effectiveness of barriers, hyaluronic acid gel and polyethylene oxide–sodium carboxymethylcellulose gel, has been assessed by five randomized studies and these have been reviewed in several meta-analyses (28,29,30,31,32,33). There is no evidence for an effect favoring the use of any barrier gel following operative hysteroscopy for the key outcomes live birth or clinical pregnancy (RR 3.0, 95% CI 0.35 to 26, P=0.32, 1 study, 30 women, very low-quality evidence). The use of any gel following operative hysteroscopy decreases the incidence of de novo adhesions at second-look hysteroscopy at 1 to 3 months (RR 0.65, 95% CI 0.45 to 0.93, P=0.02, 5 studies, 372 women, very low-quality evidence). After using any gel following operative hysteroscopy there are more AFS 1988 stage I (mild) adhesions (RR 2.81, 95% CI 1.13 to 7.01, P=0.03, 4 studies, 79 women) and less stage II (moderate) adhesions (RR 0.26, 0.09 to 0.80, P=0.02, 3 studies, 58 women) or stage III (severe) adhesions (RR 0.46, 95% CI 0.03 to 7.21, P=0.58, 3 studies, 58 women) (all very low-quality evidence).

ISGE recommendation: Gynaecologist can use gel barriers as these tend to reduce de novo adhesion formation as the one formed are less moderate to severe and more mild adhesions (very low-quality evidence). Gynaecologist should council their patients that there is no evidence for better pregnancy rates or higher birth rates following the use of barriers in operative hysteroscopy Evidence and strength of recommendation I: C.

C) Medical

Randomized studies to not point at any evidence that estrogens do prevent IUA.

Since its first use in 1964 several regimens have been proposed to promote the re-epithelialization of the endometrium after adhesiolysis (34).

No data exists on the ideal dose and length of the therapy. Preoperative estrogen therapy has been suggested to optimize the endometrial growth before the surgical intervention; however, evidence on its effectiveness is lacking. Moreover, the possible adverse effects of hormonal therapy (nausea, thromboembolic disease) should be taken into account when considering its use (35).

ISGE recommendation: Gynaecologists should council their patients that the use of estrogen therapy after hysteroscopic surgery lacks

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

scientific evidence and could gender side effects Grade II-1: C.

There is no significant evidence from any published study to recommend the use of steroids (such as dexamethasone, hydrocortisone, and prednisolone) in humans, and several side effects still have to be ascertained (36,37).

ISGE recommendation: Gynaecologists are advised to council their patients that the use of steroids cannot be recommended to avoid adhesion formation and could have side effects. Grade II-2: C.

Some case reports describe the use of other medication (aspirin, sildenafil citrate, and nitroglycerin) to promote the perfusion of the endometrium. At present no evidence exists on its efficacy and therefore its use cannot be sustained.

4. Surgical technique and equipment

Cold scissors: Here there are several advantages as it remains the most accessible means to deal with adhesions, further the surgeon has a direct view on the surface to treat she/he can avoid destruction of the surrounding endometrium. The five French channel allows for sturdy instruments and the small barrel hysteroscope (3.8 mm median) allows for assessing the uterine cavity without cervical dilatation. The latter allows for treatment of IUA without anaesthesia or sedation in an office setting (See & Treat).

Uni-polar electrical energy implements that the electrons released by the active electrode on the tissues have to travel through the tissues to the neutral, passive electrode hence causing collateral damage up to 0.6 mm in depth as a median and therefore does lengthen the time period to a restitutio ad integrum of the endometrial lining. Anionic distention medium is a must with possible distention fluid complications. The instruments are of 27 to 25 French outer diameters necessitating a cervical dilatation from 10 – 8 Hegar respectively hence requesting general anaesthesia. Today bivalent uni-bipolar resectoscopes of 15 French are available, not in need of cervical dilatation, but the uni-polar current is felt as painful and irritating by the patients. Here general anaesthesia is still recommended.

Bi-polar energy: the current remains the same monopolar electrical current but now traveling from the active towards the passive or recuperating pole integrated into the same instrument at some 6- 8 mm of distance in the 27 French resectoscopes. In the 15 French resectoscopes the distance between the poles is reduced as is the wattage of the current. The electrical current does travel only to the tissues to be operated under direct view. This results in less in-depth destruction of the tissues treated and the surrounding ones. For the large resectoscopes there is still need for dilatation. When bipolar needles of 5 French are used the surgeon can use small barrel diagnostic scope with an outer diameter of 3.8 mm on average. Here cervical dilatation is not necessary and as the passage of the electrical current affects only the tissues treated. The patient is less uncomfortable so office procedures without anaesthesia can be performed.

Laser Light: The only available lasers are the Nd-YAG and Diode laser systems where heat is diffused into the tissues causing thermal damage up to one cm in depth. The fibers are very fragile

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

and expensive to replace. It can be used through small barrel scopes and can therefore be used without anesthesia or sedation. (38).

Mechanical Energy by morcellation: These instruments do not need electrical energy hence the influence on the surrounding tissues is nonexistent. This allows for quicker regeneration of the endometrial lining in polypectomy and removal of retained products of conception. (39,40).

The first generation of morcellators with an outer diameter of 26 French did necessitate general anaesthesia whereas the newer generation with an outer diameter of 19 French can be used without anaesthesia in selected, multiparous, patients for in office procedures.

5. Prevention of adhesions in laparoscopy laparotomy and gasless laparoscopy

A) Technical Surgical Aspects

1. Surgical manipulation

Preventing adhesions implicates the use of a meticulous surgical technique.

The aim is to adjust the technique to minimize the trauma to the different structures and above all to the peritoneum, to minimize the risk of infection, to achieve the best optimal haemostasis and to avoid contamination with foreign materials such as glove powder (41,42)

The Halstedian principles of gentle tissue handling and meticulous haemostasis prevent the presence of free blood and ischemic tissues (43). Laparoscopic approach is generally preferred over laparotomy until now however there is no evidence in randomized control trials concerning the formation of adhesions.

2. Blood

There is a lack on randomized control trial concerning the importance of blood in the abdominal cavity and adhesion formation. Animal studies however indicate that blood left in the abdominal cavity at surgery is a factor inducing adhesion formation (44). The abdomen should be cleaned with Ringers lactate at the end of the surgery. The blood is easier aspirated if heparin (5.000IU/lit) is added to the Ringers lactate as clot formation is reduced. When there are no peritoneal injuries in animals, small clots do not enhance adhesion formation whilst large clots do (45).)

ISGE recommendation: There is good evidence, in well-designed case-control studies in animals, that rising blood out of the abdomen decreases the formation of adhesions. Grade II-2: A

3. Meshes and Suture material

There are no randomized trials comparing neither meshes nor threads to the formation of adhesions in the human. Leaving a mesh exposed to the abdominal cavity (not covered by peritoneum) will result in an increased risk of adherence to the mesh, with the risk of bowel obstruction. This is also true for exposed barbed sutures (46). The presence of suture material and tightening the sutures to the point of ischemia promotes adhesion formation (47).

ISGE recommendation: gynaecologists should cover all meshes and barbed sutures. The use monofilament resorbable sutures is recommended. Grade II-1: B.

4. Equipment

Ultrasonic and laser energy can be used to minimize tissue damage. Uni-polar energy does most likely cause more tissue damage due to the

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

passage through the tissues on the way to the return electrode.

B Conditioning the peritoneal environment

The CO2 gas used to insufflate and to maintain the pneumoperitoneum affects the whole abdominal cavity. There is evidence from small trials in human that switching to a mixture of carbon dioxide with 10% nitrous oxide and 4% oxygen can decrease adhesion (48). A trial study on 44 women who did undergo surgery for laparoscopic resection of endometriosis demonstrated a significant reduction in adhesion formation ($P<0.0005$) however the patients in the study group did also receive dexamethasone, a rising with heparin was performed and the humidity and the temperature of the abdomen were also monitored (49).

C) Local products

1. Floatation barriers (Ringer's lactate, Saline, Hartman's solution)

Meta–analysis of clinical trial demonstrates clearly that the effect of the 'flotation agents" is nonexistent in preventing adhesion formation both in laparotomy and in laparoscopy (50,51).

This is due to the rapid absorption of the liquids by the peritoneum at a rate of 30-60 ml/h leading to the disappearance of the fluids within 24-48 h. This time span is too short to be effective in preventing adhesion formation.

ISGE recommendation flotation barriers should not be used to prevent adhesion formation. Grade II-1: D

Adept (4% icodextrin solution – Baxter Biosurgery, Baxter International, Deerfield Il, USA) used in animal and peritoneal dialysis seems to have sufficient long intra peritoneal presence to prevent adhesion formation (52). Standard recommendation is to use the solution throughout the surgery and leave 1.000 ml in the abdomen at termination of the surgery (53,54). One randomized controlled pilot study where lavage during surgery and instillation of 4% icodextrin was practiced showed the treatment to be well tolerated and above all did show a reduced incidence in adhesion formation both in extent and severity at laparoscopic adnexal surgery however the group sizes were not powered to statistical significance (54). More recently these findings have been confirmed in a study concerning patients operated for adhesions (55). As adverse reactions are listed: vulvar edema, allergic reactions (allergy to starch based polymers and iso-maltose intolerance), fluid leakage through the wounds and in some cases abdominal distention and discomfort (56).

ISGE recommendation: 4% icodextrin solution can be used, in the prescribed methodology, in patients operated for ADR. Grade I: C.

2. Gel barriers

Hyaluronic Acid

In a large multicenter randomized trial Intergel® (ferric hyaluronate, Ethicon – J&J, Somerville, New Jersey, USA) was proved to be effective in reducing the extension and severity of post-operative adhesions as compared to Ringer's solution in patients undergoing peritoneal cavity surgery by laparotomy with a planned second-look laparoscopy (57).

Due to unacceptable post-operative complications the gel is no longer available (58).

Hyalobarrier Gel Endo (Auto-cross linked hyaluronic acid, Nordic Pharma, Dublin Ireland) is suitable for use to prevent adhesion formation in abdominal surgery due to its adhesivity and

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

prolonged stay in time on the treated surfaces. Thirty-six patients, treated with Hyaolobarrier Gel Endo in a randomized controlled study, who underwent laparoscopic myomectomy showed a significant reduction in postoperative adhesion formation (59). The same authors did demonstrate the application of the gel in cases of laparoscopic myomectomy to be associated with an increased pregnancy rate (60). These findings including a favorable safety profile have been confirmed in a blinded, randomized, multicenter study provided the gel is used at the end of the surgery as rinsing is able to remove the gel (61).

ISGE recommendation there is sufficient evidence to recommend the use of Hyalobarrier gel after laparoscopic surgery for myomata. Grade I: A

Solution of hyaluronic acid, Sepracoat® coating solution, a solution of hyaluronic acid, (HAL-C; Genzyme Corporation, Cambridge, USA), is a liquid composed of 0.4 % sodium hyaluronate in phosphate buffered saline, it is applied intraoperative, prior to the dissection, to protect peritoneal surfaces from indirect surgical trauma or post-operatively to separate surfaces after they are traumatized. There are no studies in the literature evaluating Sepracoat® in preventing adhesions following laparoscopic gynecological procedures. The efficacy in laparotomy was well established (62).

ISGE recommendation there is enough evidence to recommend Sepracoat in open surgery. Grade I: A

Hydrogel, Spraygel® or Sprayshield® (Covidien, Dublin, Ireland) consist of two synthetic liquid precursors that, when mixed, rapidly cross-link to form a solid, flexible, absorbable hydrogel. The solid polymer is easily applied by laparoscopy; however, it can only be applied when in contact with room air after evacuation of the CO2 this could cause air-embolisms. Sprayshield® sprayed over the affected area and remains for approximately 5 to 7 days. There after it is degraded and absorbed. One of the components contains a blue food colorant, so there is an intraoperative visualization where the gel is used. The currently available evidence does not support the use of Sprayshield® either decreasing the extent of adhesion or in reducing the proportion of women with adhesions. In a prospective blinded observational study our group, Bruno Johan van Herendael, Benedikt Tas, Marc Francx and Bart De Vree at Ziekenhuis Netwerk Antwerp, 2004 -2005 evaluated 22 patients treated with Sprayshield with second look laparoscopy compared to 22 non treated, comparable patients. The conclusion was that using the gel did reduce de novo adhesions at second look laparoscopy as compared to the non-treated patients but the study is too small to draw conclusions (Randomised observational prospective trial: never published) (Fig 5). Mettler et al randomized 64 women undergoing a myomectomy by laparoscopy or laparotomy. Only 22 returned for a second look laparoscopy. Although the treated patients were more adhesion free at second look laparoscopy compared with the control group; the difference was not significant (63). More randomized and especially blinded prospective studies are need to obtain scientific proof of the efficacy of Sprayshield®

Other gel barriers

Intercoat® (Ethicon – J&J, Somerville, New Jersey, USA) a viscoelastic absorbable gel of polyethylene oxide and carbomethylcellulose is stabilized by calcium chloride. At the end of the

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

procedure the coating is applied in a single layer to function as a mechanical barrier. Lundorff et al published the results of a randomized third party blinded multicenter European trial showing that visco-elastic gel did significantly reduce adnexal adhesions in patients undergoing gynecological laparoscopic surgery (64).

At the same time period Young et al published a randomized study evaluating Oxiplex/AP gel (FzioMed, San Luis Obospo, California) Their conclusion is that the gel is safe, easy to use during laparoscopic surgery and contributes to a reduction of adnexal adhesions (65).

CoSeal (resorbable hydrogel polyethylene glycolpolymer solution – Baxter Biosurgery, Deerfield, Il USA) is extensively used in vascular surgery reconstruction operations (over 200.00 patients since 2002). In both open and laparoscopic surgery, provided good surgical technique is used, the gel reduces significantly, incidence, extent and severity of postoperative adhesions (66).

ISGE recommendation: There is evidence that both other gel barriers are safe to use and do reduce adhesion formation. Grade II-2: A

3. Sheets

Gore-Tex Surgical membrane (W.L. Gore & Associates Inc, Flagstaff, USA) The expanded polytetrafluorethylene non absorbable barrier is characterized by a microscopic structure preventing cellular ingrowth at the same time it is non-inflammatory. In patients undergoing laparotomy for adhesiolysis or myomectomy the membrane decreases the severity, extent and incidence of adhesions (67). The limitations of the membrane are that it has to be sutured in place and removed during subsequent surgery. It is therefore very difficult to use it at laparoscopic surgery.

Interceed (Ethicon–J&J, Sommerville, New Jersey, USA) The oxidized regenerated cellulose membrane is widely used to prevent adhesions at surgery as it has been proved to reduce adhesion formation in animals and in human. The damaged peritoneal surfaces are covered with the membrane that transforms itself to a gelatinous mass. In doing so it forms a physical barrier that separates adjacent damaged peritoneal surfaces. Over 13 clinical trials including 600 patients have been performed. The meta-analysis of 10 randomized control trials reported 24.2% reduced adhesion formation on the side treated with the barrier (68). However, in the presence of bleeding the sheet seems to aggravate adhesion formation rather than reduce it.

Seprafilm (Genzyme Biosurgery, Bridgewater, USA) this sodium hyaluronate – carbomethylcellulose membrane ids placed over a suture or an injured peritoneum without stich and remains there for some seven days. Here a bleeding seems not to impair the efficacy of membrane. In general surgery several studies did report the efficacy of Seprafilm over 20 studies on over 4000 patients are reported in the literature (67). The problem in laparoscopy is that the membrane is fragile and difficult in use.

4. Drugs

The NSAID ketorolac has shown some evidence to prevent adhesions in animals (69). Dexamethasone combined with noxythiolin (peritoneum antiinfection agent) have been tested in 126 patients operated by microsurgery and assessed by a second look laparoscopy three to six months later. In the control group 19% of the patients became pregnant versus 40% of

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

patients in the treated group (p<0.02). The improvement in the adhesion score in the treated group was 23.3 and in the control group 10.2 (70).

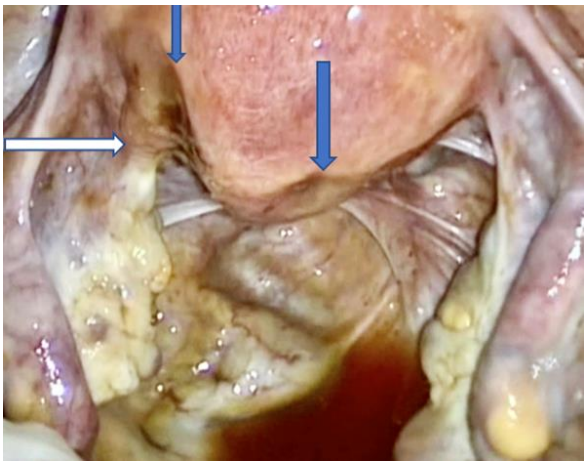


Fig 5: Second Look laparoscopy: White arrow subtle thin adhesions after major posterior myomectomy after the use of barriers (Sprayshield). Blue arrows: impressions of the ischemic sutures at laparoscopic myomectomy using Vicryl 1 resorbable suture. (ZNA series second look)

Discussion

The general consensus is that adhesion formation is a persistent companion in surgery sometimes leading to ARD. To reduce ARD to a minimum good surgical technique is the key ingredient to maximal reduction of postoperative adhesion formation. It is important to adhere to Evidence Based Medicine (EBM). EBM being the integration of individual clinical expertise, best available external clinical evidence and last but not least patient's values and expectations. Individual clinical expertise boils down to good surgical technique and the fact that it could be better to consult a colleague with expertise in ARD and send the patient to his/her center eventually to go and assist the colleague to get personal expertise. In ARD due to postoperative adhesion formation, it is important to adhere to the second pilar of EBM and integrate the best available external clinical evidence in our judgement as to help the individual patient the best possible way at the least costs for the health system. Although EBM is never sufficient to make clinical decision, EBM points to a hierarchy of evidence so that the individual surgeon can make her/his specific clinical decision. The patient's values and expectations can be multiple but in essence these will be functional solutions to the patient's problem be it infertility or abdominal discomfort and pain. This does not mean an anatomical solution but rather a functional solution to the problems at hand.

In hysteroscopic surgery the data suggest that mechanical tools, scissors and morcellation, interfere the least with the endometrium. In the prevention of IUA only an in office second look hysteroscopy after 6 weeks in the immediate postmenstrual period is congruent with the above EBM principles. Postoperative hyaluronic gel application can be of help but is quite expensive and at this moment in time there is no evidence. Estrogen in whatever dosage can be given especially in patients with proven hypotrophic endometrium at biopsy. There is no proof of its efficacy in hormonal balanced pre-menopausal patients.

Concerning open surgery, laparoscopic surgery and gasless laparoscopic surgery meticulous surgical technique is of utmost importance. Residual blood should be avoided and this can be obtained by careful hemostasis and rinsing with Ringers Lactate with heparin. The proper sutures should be used and preferable no braided sutures are left in the abdominal cavity. The use of floatation barriers does not seem to add substantial benefit in the prevention of

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

adhesions. Gel barriers (Hyalobarrier gel Endo® or Intercoat®) based on hyaluronic acid are proven to have a significant effect on adhesion prevention. The inconvenient is that these gel barriers are costly. We therefore do advocate a very cautious and proper use of these barriers. As for sheets there is enough evidence, they prevent adhesions. The use of NSAID in the prevention of pain and or corticosteroids in the prevention of post-operative nausea is already mainstay after surgery and can be further endorsed in the prevention of adhesions. A resume of the above reflection can be found in table 2.

Altering the laparoscopic gas to a mixture of carbon dioxide + 10% nitrous oxide + 4% oxygen may be a future option as this is an easy way to prevent adhesions, but further studies are needed to provide stronger data regarding efficacy and safety.

ISGE Recommendations

Prevention of adhesions post operative			LoE
Hysteroscopy	IUCD	No evidence	I: A
	Barriers	No evidence better pregnancy rates	I: A
		Evidence less adhesion formation	I: C
	Oestrogens	No evidence	II-1: C
	Steroids	No evidence	II-2: C
Laparoscopy	Blood	Evidence	II-2: A

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

	Sutures and meshes	Evidence	II-1: B
	Flotation barriers	No evidence	II-1:D
	Adept®	Evidence	I: C
	Intergel®	Evidence	I: E
	Hyalobarrier gel®	Evidence	I: A
	Sepracoat®	Evidence	I: A
	Sprayshield®	No Evidence	II-2: C
	Intercoat® Oxiplex/AP®	Evidence	II-2: A
	CoSeal®	Evidence	II-1: A
	Gore-Tex	Evidence	II-2: A
	Interceed®	Evidence	I: C
	Seprafilm®	Evidence	II-2: B

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

Tab 3: ISGE recommendations to prevent adhesions in hysteroscopy and laparoscopy, open surgery and gasless laparoscopy.

GRADE approach – grading of recommendations, risk/benefit and quality of supporting evidence.

Grade of recommendation	Risk/benefit	Quality of supporting evidence
1A. Strong recommendation, high quality evidence	Benefits clearly outweigh risk and burdens, or vice versa.	Consistent evidence from well performed randomized, controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk.
1B. Strong recommendation, moderate quality evidence	Benefits clearly outweigh risk and burdens, or vice versa.	Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate.
1C. Strong recommendation, low quality evidence	Benefits appear to outweigh risk and burdens, or vice versa.	Evidence from observational studies, unsystematic clinical experience, or from randomized, controlled trials with serious flaws. Any estimate of effect is uncertain.
2A. Weak recommendation, high quality evidence	Benefits closely balanced with risks and burdens.	Consistent evidence from well performed randomized, controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk.
2B. Weak recommendation, moderate quality evidence	Benefits closely balanced with risks and burdens, some uncertainly in the estimates of benefits, risks and burdens.	Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate.
2C. Weak recommendation, low quality evidence	Uncertainty in the estimates of benefits, risks, and burdens; benefits may be closely balanced with risks and burdens.	Evidence from observational studies, unsystematic clinical experience, or from randomized, controlled trials with serious flaws. Any estimate of effect is uncertain.

Tab 4 Recommendations Different grades and their explanation.

References

1. Ellis D. Moran BJ, Thompson JN et al: Adhesion-related hospital readmissions after abdominal and pelvic surgery: a retrospective cohort study. The Lancet 1999 May; 1:353.

2. Liakakos T, Thomakos N, Fine PM, Dervenis C, Young RL (2001) Peritoneal adhesions: etiology, pathophysiology, and clinical significance recent advances in prevention and management. Dig Surg 18:260–273.

3. Lower AM, Hawthorn RJ, Ellis H, O'Brien F, Buchan S, Crowe AM. The impact of adhesions on hospital readmissions over ten years after 8849 open gynaecological operations: an assessment from the Surgical and Clinical Adhesions Research Study. BJOG 2000; 107:855-62.

4. Taskin O, Sadik S, Onoglu A, Gokdeniz R, Erturan E, Burak F, Wheeler JM Role of endometrial suppression on the frequency of intrauterine adhesions after resectoscopic surgery. J Am Assoc Gynecol Laparosc. 2000 Aug;7(3):351-4.

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

5. Asherman JG Traumatic intrauterine adhesions. Br J Obstet Gyneacol 1950; 57:892-896.

6. Yang JH, Chen MJ, Chen CD, Chen SU, Ho HN, Yang YS. Optimal waiting period for subsequent fertility treatment after various hysteroscopic surgeries. Fertil Steril. 2013 Jun;99(7):2092-6. e3.

7. Menzies D, Ellis H. Intestinal obstruction from adhesions--how big is the problem? Ann R Coll Surg Engl. 1990;72:60-63.

8.Van der Krabben AA, Dijkstra FR, Nieuwenhuijzen M, Reijnen MMPJ, Schaapveld M, van Goor H. Morbidity and mortality of inadvertent enterotomy during adhesiotomy. Br J Surg 2000;87:467-71.

9. Schenker JG, Margalioth EJ. Intrauterine adhesions: an updated appraisal. Fertil Steril. 1982; 37:593–61.

10. Kodaman PH, Arici A. Intra-uterine adhesions and fertility outcome: how to optimize success? Curr Opin Obstet Gynecol. 2007;19(3):207–214.

11.Deans R, Abbott J. Review of intrauterine adhesions. J Minim Invasive Gynecol. 2010; 17:555.

12. Nappi C, Di Spiezio Sardo A, Greco E, Guida M, Bettocchi S, Bifulco G. Prevention of adhesions in gynaecological endoscopy. Hum Reprod Update. 2007 Jul-Aug;13(4):379-94.

13. Revaux A, Ducarme G, Luton D. Prevention of intrauterine adhesions after hysteroscopic surgery. Gynecol Obstet Fertil. 2008 Mar;36(3):311-7.

14. diZerega GS. Biochemical events in peritoneal tissue repair. Eur.J. Surg.Suppl 1997;10-16.

15. diZerega GS, Campeau JD. Peritoneal repair and post-surgical adhesion formation. Hum Reprod Update. 2001; 7:547-55.

16. Verguts J, Bosteels J, Corona R, Hamerlynck T, Mestdagh G, Nisolle M, Puttemans P, Squiflet JL, van Herendael BJ, Weyers S. Belgian Consensus on Adhesion Prevention in Hysteroscopy and laparoscopy. Gynecol Surg 2015 DOI 10.1007/s10397-015-0887-3

17. Fotev Z, Whitaker D, Papadimitriou JM. Role of Macrophages in Mesothelial Healing. J Pathol 1987; 151:209-19.

18. Tolhurst Cleaver CL, Hopkins AD, Kee Kwong KC, Raftery AT. The effect of postoperative peritoneal lavage on survival, peritoneal wound healing and adhesion formation following fecal peritonitis: an experimental study in the rat. Br J Surg 1974; 61:601-04.

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

19. Corona R, Verguts J, Schonman R, Binda MM, Mailova K, Koninckx PR. Postoperative inflammation in the abdominal cavity increases adhesion formation in a laparoscopic mouse model. Fertil Steril. 2011 Mar 15;95(4):1224-8.

20. Molinas CR, Tjwa M, Vanacker B, Binda MM, Elkelani O, Koninckx PR. Role of CO_2 pneumoperitoneum-induced acidosis in CO_2 pneumoperitoneum-enhanced adhesion formation in mice. Fertil Steril. 2004 Mar;81(3):708-11.

21. Corona R, Verguts J, Koninckx R, Mailova K, Binda MM, Koninckx PR. Intraperitoneal temperature and desiccation during endoscopic surgery. Intraoperative humidification and cooling of the peritoneal cavity can reduce adhesions. Am J Obstet Gynecol. 2011 Oct;205(4): 392.e1-7.

22. Bentes de Souza AM, Chiu Wang C, Yan Chu C, Lam PM, Scott Rogers M. The effect of intra-abdominal pressure on the generation of 8-iso prostaglandin F2alpha during laparoscopy in rabbits. Hum Reprod 2003 Oct;18(10):181-8. Doi.10.1093/humrep/deg405.

23. March CM, Israel R. Gestational outcome following hysteroscopic lysis of adhesions. Fertil Steril. 1981 Oct;36(4):455-9.

24. Vesce F, Jorizzo G, Bianciotto A, Gotti G. Use of the copper intrauterine device in the management of secondary amenorrhea. Fertil Steril. 2000 Jan;73(1):162-5.

25. Orhue AA, Aziken ME, Igbefoh JO. A comparison of two adjunctive treatments for intrauterine adhesions following lysis. Int J Gynaecol Obstet. 2003 Jul;82(1):49-56.

26. Deans R, Abbott J. Review of intrauterine adhesions. J Minim Invasive Gynecol. 2010 Sep-Oct;17(5):555-69.

27. Sanfilippo JS, Fitzgerald MR, Badawy SZ, Nussbaum ML, Yussman MA. Asherman's syndrome. A comparison of therapeutic methods. J Reprod Med. 1982 Jun;27(6):328-30.

28. Acunzo G, Guida M, Pellicano M, Tommaselli GA, Di Spiezio Sardo A, Bifulco G, Cirillo D, Taylor A, Nappi C. Effectiveness of auto-cross-linked hyaluronic acid gel in the prevention of intrauterine adhesions after hysteroscopic adhesiolysis: a prospective, randomized, controlled study. Hum Reprod. 2003;18(9):1918–1921

29. De Iaco PA, Muzzupapa G, Bovicelli A, Marconi S, Bitti SR, Sansovini M, Bovicelli L. Hyaluronan derivative gel (Hyalobarrier gel) in intrauterine adhesion (IUA) prevention after operative hysteroscopy. Ellipse. 2003;19(1):15–18.

30. Di Spiezio Sardo A, Spinelli M, Bramante S, Scognamiglio M, Greco E, Guida M, Cela V, Nappi C. Efficacy of a polyethylene oxide–sodium carboxymethylcellulose gel in prevention of

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

intrauterine adhesions after hysteroscopic surgery. J Minim Invasive Gynecol. 2011;18(4):462–469.

31. Guida M, Acunzo G, Di Spiezio Sardo A, Bifulco G, Piccoli R, Pellicano M, Cerrota G, Cirillo D, Nappi C. Effectiveness of auto-crosslinked hyaluronic acid gel in the prevention of intrauterine adhesions after hysteroscopic surgery: a prospective, randomized, controlled study. Hum Reprod. 2004;19(6):1461–1464.

32. Pansky M, Fuchs N, Ben Ami I, Tovbin Y, Halperin R, Vaknin Z, Smorgick N. Intercoat (Oxiplex/AP Gel) for preventing intrauterine adhesions following operative hysteroscopy for suspected retained products of conception—a pilot study. J Minim Invasive Gynecol. 2011;18(S21):68

33. Bosteels J, Weyers S., Mol B, D'Hooghe T. Anti-adhesion barrier gels following operative hysteroscopy for treating female subfertility: a systematic review and meta-analysis. Gynecological Surgery 2014; 11: 113-127.

34. Wood J, Pena G. Treatment of traumatic uterine synechia's. Int J Fertil. 1964 Apr-Jun; 9:405-10.

35. Magos A. Hysteroscopic treatment of Asherman's syndrome. Reprod Biomed Online. 2002;4 Suppl 3:46-51. Review.

36. Watson A, Vandekerckhove P, Lilford R. Liquid and fluid agents for preventing adhesions after surgery for subfertility. Cochrane Database Syst Rev. 2000;(3):CD001298.

37. Metwally M, Watson A, Lilford R, Vandekerckhove P. Fluid and pharmacological agents for adhesion prevention after gynaecological surgery. Cochrane Database Syst Rev. 2006 Apr 19;(2):CD001298.

38. Haimovich S, Mancebo G, Alameda F, Agramunt S, Solé-Sedeno JM, Hernández JL, Carreras R. Feasibility of a new two-step procedure for office hysteroscopic resection of submucous myomas: results of a pilot study. Eur J Obstet Gynecol Reprod Biol. 2013 Jun;168(2):191-4.

39. van Wessel S, van Vliet H AAM, Schoot BC, Weyers S, Hamerlynck TWO. Hysteroscopic morcellation versus bipolar resection for removal of type 0 and 1 submucous myomas: A randomized trial Eur J Obstet Gynecol Reprod Biol. 2021 Apr; 259:32-37. doi: 10.1016/j.ejogrb.2021.01.050. Epub 2021 Jan 29.

40. Hamerlynck TW, van Vliet HA, Beerens AS, Weyers S, Schoot BC. Hysteroscopic Morcellation versus Loop Resection for Removal of Placental Remnants: a Randomized trial. J Minim Invasive Gynecol. 2016 Nov-Dec;23(7):1172-1180. doi: 10.1016/j.jmig.2016.08.828. Epub 2016 Aug 30.

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

41. Risberg B. Adhesions: preventive strategies. Eur J Surg Suppl. 1997;(577):32-9.

42. Robertson D, Lefebvre G, Leyland N, Wolfman W, Allaire C, Awadalla A, Best C, Contestabile E, Dunn S, Heywood M, Leroux N, Potestio F, Rittenberg D, Senikas V, Soucy R, Singh S; Society of Obstetricians and Gynaecologists of Canada. SOGC clinical practice guidelines: Adhesion prevention in gynaecological surgery: no. 243, June 2010. Int J Gynaecol Obstet. 2010 Nov;111(2):193-7.

43. Rock JA, Thompson JD in Te Linde's Operative Gynecology Rock JA and Thompson JD editors Lippincott – Raven Philadelphia PA 1977 Chapter 11 p 214)

44. Corona R, Binda MM, Mailova K, Verguts J, Koninckx PR. Addition of nitrous oxide to the carbon dioxide pneumoperitoneum strongly decreases adhesion formation and the dose-dependent adhesiogenic effect of blood in a laparoscopic mouse model. Fertil Steril. 2013 Dec;100(6):1777-83.

45. Diamond MP, Decherney AH. Pathogenesis of adhesion formation/reformation: application to reproductive pelvic surgery. Microsurgery. 1987;8(2):103-7. Review.

46. Wang l, Maejima T, Nishihara S, Yoshikawa, Kono T. Bowel obstruction and perforation secondary to barbed suture after minimally invasive inguinal hernia repair: a report of two cases and literature review. Surg Case Rep 2021;7(1):161 DOI 10.1186/s40792-02149-w.

47. Luijendijk RW, de Lange DC, Wauters CC, Hop WC, Duron JJ, Pailler JL, Camprodon BR, Holmdahl L, van Geldorp HJ, Jeekel J. Foreign material in postoperative adhesions. Ann Surg. 1996 Mar;223(3):242-8.

48. Koninckx PR, Corona R, Timmerman D, Verguts J, Adamyan L. Peritoneal full-conditioning reduces postoperative adhesions and pain: a randomised controlled trial in deep endometriosis surgery. J Ovarian Res. 2013 Dec 11;6(1):90.

49. Mynbaev OA, Biro P, Eliseeva MY, Tinelli A, Malvasi A, Kosmas IP, Medvediev MV, Babenko TI, Mazitova MI, Simakov SS, Stark M. A: Koninckx PR, Corona R, Timmerman D, Verguts J, Adamyan L. Peritoneal full-conditioning reduces postoperative adhesions and pain: a randomised controlled trial in deep endometriosis surgery. J Ovarian Res. 2013 Dec 11;6(1):90. J Ovarian Res. 2014 Mar 10;7(1):29.

50. Wiseman DM, Trout JR, Diamond MP. The rates of adhesion development and the effects of crystalloid solutions on adhesion development in pelvic surgery. Fertil Steril. 1998 Oct;70(4).

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

51. Ahmad G, Mackie FL, Iles DA, O'Flynn H, Dias S, Metwally M, Watson A. Fluid and pharmacological agents for adhesion prevention after gynaecological surgery. Cochrane Database Syst Rev. 2014 Jul 9;7:CD001298.

52. Harris ES, Morgan RF, Rodehaver GT. Analysis of the kinetics of peritoneal adhesion formation in the rat an evaluation of potential antiadhesive agents. Surgery 1995; 117:663-669.

53. Verco SJS, Peers EM, Brown CB, Rodgers KE, Roda N, diZerega GS. Development of a novel glucose polymer solution (icodextrin) for adhesion prevention: pre-clinical studies. Hum Reprod 2000;15:1764-1772

54. diZerega GS,Verca SJS,Young P, Kettel M, Kobak W et al. A randomized, controlled pilot study of the safety and efficacy of 4% icodextrin solution in the reduction of adhesions following laparoscopic gynecological surgery. Human Reprod 2002; 17:1031-1038.

55. Brown CB, Luciano AA, Martin D, Peers E, Scrimgeour A, diZerega GS. On behalf of the Adept Adhesion Reduction Study Group. Adept® (icodextrin 4% solution) reduces adhesions after laparoscopic surgery for adhesiolysis: a double-blind, randomized, controlled study. Fertil Steril 2006; 88:1413-1426.

56. Douplis D, Majeed GS, Sieunarine K, Richardson R, Smith JR. Adverse effects related to icodextrin 4%. Our experience. Gynaecol Surg 2007; 4:97-100.

57. Johns DB, Keyport GM, Hoehler F, diZerega GS; Intergel Adhesion Prevention Study Group Reduction of postsurgical adhesions with Intergel adhesion prevention solution: a multicenter study of safety and efficacy after conservative gynecologic surgery. Fertil Steril. 2001 Sep;76(3):595-604.

58. Tang CL, Jayne DG, Seow-Choen F, Ng YY, Eu KW, Mustapha N. A randomized controlled trial of 0.5% ferric hyaluronate gel (Intergel) in the prevention of adhesions following abdominal surgery. Ann Surg. 2006 Apr;243(4):449-55.

59. Pellicano M, Bramante S, Cirillo D, Palomba S, Bifulco G, Zullo F, Nappi C. Effectiveness of autocross linked hyaluronic acid gel after laparoscopic myomectomy in infertile patients: a prospective, randomized, controlled study. Fertil Steril. 2003 Aug;80(2):441-4.

60. Pellicano M, Guida M, Bramante S, Acunzo G, Di Spiezio Sardo A, Tommaselli GA, Nappi C. Reproductive outcome after autocross linked hyaluronic acid gel application in infertile patients who underwent laparoscopic myomectomy. Fertil Steril. 2005 Feb;83(2):498-500.

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

61. Mais V, Bracco GL, Litta P, Gargiulo T, Melis GB. Reduction of postoperative adhesions with an auto-crosslinked hyaluronan gel in gynaecological laparoscopic surgery: a blinded, controlled, randomized, multicenter study. Hum Reprod. 2006 May;21(5):1248-54.

62. Diamond MP. Reduction of de novo postsurgical adhesions by intraoperative precoating with Sepracoat (HAL-C) solution: a prospective, randomized, blinded, placebo-controlled multicenter study. The Sepracoat Adhesion Study Group. Fertil Steril. 1998 Jun;69(6):1067-74.

63. Mettler L, Audebert A, Lehmann-Willenbrock E, Schive-Peterhansl K, Jacobs VR. A randomized, prospective, controlled, multicenter clinical trial of a sprayable, site-specific adhesion barrier system in patients undergoing myomectomy. Fertil Steril. 2004 Aug;82(2):398-404.

64. Lundorff P, Donnez J, Korell M, Audebert AJM, Block K, diZerega GS. Clinical evaluation of a viscoelastic gel for reduction of adhesions following gynaecological surgery by laparoscopy in Europe. Hum Reprod 2005; 20:514-520.

65. Young P, Johns A, Templeman C, Witz C, Webster B, Ferland R, Diamond MP, Block K, diZerega G. Reduction of postoperative adhesions after laparoscopic gynecological surgery with Oxiplex/AP Gel: a pilot study. Fertil Steril. 2005 Nov;84(5):1450-6.

66. Mettler L, Hucke J, Bojar B, Tinneberg HR, Leyland N, Avelar A. A safety and efficacy study of the resorbable hydrogel for reduction of post-operative adhesions following myomectomy. Human Reprod 2008; 23:1093-100.

67. Farquhar C, Vandekerckhove P, Watson A, Vail A, Wiseman D. Barrier agents for preventing adhesions after surgery for subfertility. Cochrane Database Syst Rev. 2000;(2):CD000475.

68. Wiseman DM, Trout JR, Franklin RR, Diamond MP. Metanalysis of the safety and efficacy of an adhesion barrier (Interceed TC7) in laparotomy. J Reprod Med. 1999 Apr;44(4):325-3.

69. Montz FJ, Monk BJ, Lacy SM, Fowler JM. Ketorolac tromethamine, a nonsteroidal anti-inflammatory drug: ability to inhibit post-radical pelvic surgery adhesions in a porcine model. Gynecol Oncol. 1993 Jan;48(1):76-9.

70. Querleu D, Vankeerberghen-Deffense F, Boutteville C. Adjuvant treatment of tubal surgery. Randomized prospective study of systemically administered corticoids and noxythiolin. J Gynecol Obstet Biol Reprod (Paris). 1989;18(7):935-40.

Corresponding author: Bruno J van Herendael bruno.vanherendael@isge.org
DOI: 10.36205/trocar trocar3.2022001
Received 08.2022 - Accepted 09.2022

THE INTERNATIONAL SOCIETY FOR GYNECOLOGIC ENDOSCOPY
PROMOTING VAGINAL SURGERY

the Trocar
Official Online Journal of ISGE

TheTrocar Issue 3 Volume 3 / Page 22-32 ISSN: 2736-5530

The role of hysteroscopy in assessing the impact of endometriosis on eutopic endometrium

Author: Amal Drizi[1]

Affiliation: [1] Independent consultant in obstetrics and gynecology, Algiers, Algeria.

Abstract

In patients with endometriosis, there are 2 types of endometria: the ectopic endometrium which defines the disease; and the eutopic endometrium, the one normally located inside the uterine cavity. Today, there is consistent data about both tissues. The existence of interferences and mutual impacts between the two has always been a matter of interest for researchers. In this article, we are addressing the impact of endometriosis on the eutopic endometrium as well as the role of hysteroscopy in diagnosing the resulting changes at an early stage. Chronic enhanced inflammation as well as progesterone resistance are changing the paradigm of the disease, previously restricted to hyperestrogenia. This results in a dysfunctional inflammatory endometrium, with enhanced vascularity and proliferative trends, ranging from endometrial polyps to carcinoma. Hysteroscopy plays a capital role in diagnosing the different stages of this impact. Practitioners need to increase awareness of this issue by giving closer attention to the intrauterine mucosa. Although more studies are necessary, eutopic endometrium of patients with endometriosis already appears as important to monitor on the long term. To our best knowledge, this is the first paper to directly address this problematic issue.

Key words: Endometriosis; eutopic endometrium; progesterone resistance; impaired inflammation; hysteroscopy

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

Introduction:

The impact of endometriosis on eutopic endometrium is one of the most overlooked facets of the disease, receiving limited attention from researchers and practitioners. In our usual general thinking, it is mostly thought of as a consequence of impaired ovarian functions. In fact, endometriosis is well known to cause ovulatory disorders. The latter do ultimately impact the eutopic endometrium, as it is a hormone responsive mucosa. The resulting hyperestregenia resulting from chronic dysovuluation is thought to alter the eutopic endometrium.

However, endometriosis, as a chronic inflammatory disease par excellence, does affect the eutopic endometrium, even in normally ovulating patients. When practiced in a thoughtful way by a practitioner aware of these changes, hysteroscopy allows to diagnose this impact at different stages.

The changes of the eutopic endometrium in patients with endometiosis as compared to women without endometriosis: Different parameters have been reported to be impaired in the eutopic endometrium of patients with endometriosis: higher density of nerve fibers; quantitative and qualitative differences in expression of Epidermal growth factor system; altered proteome displaying evident trends of dysregulation, to mention just a few (1-3). To date, researchers aim to set a list of characteristic changes of the mucosa as biomarkers for the diagnosis of endometriosis via an endometrial sampling, an interesting diagnostic approach which still remains to be defined (4).

Researchers agree that the ensemble of the fundamental abnormal changes within the eutopic endometrium of women with endometriosis globally shows tendency towards enhanced proliferation and angiogenesis (5). The main anomalies can be summarized in two essential categories: progesterone resistance and impaired endometrial inflammation.

Progesterone resistance was a very interesting discovery. The eutopic endometrium in women with endometriosis does not properly express the hormone receptors, even in normally functioning ovaries. This aspect is changing the paradigm of the disease from an estrogen-dependent condition to a progesterone-resistance problem (6,7). Additionally, endometriosis being a major inflammatory disease, does also affect the patient's eutopic endometrium. Among the impaired inflammatory parameters which have already been described within the mucosa: over-expression of pro-inflammatory cytokines; auto-antibodies against endometrial cells as well as a different behavior of some endometrial immune cells with a manifest trend toward pro-inflammatory properties, compared to women without the disease (8).

Another interesting fact is the close interrelation between progesterone resistance and impaired endometrial inflammation [fig 1]. On the one hand, inflammation is already known to cause progesterone resistance (9). On the other hand, the anti-inflammatory properties of the latter hormone have been demonstrated in physiology, as it suppresses production and action of proinflammatory markers and cells (7). Progesterone withdrawal at the end of the menstrual cycle allows the immune cells to resume their cytotoxic effect, which partly contributes to the shedding of the mucosa and the onset of menses (10,11)

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

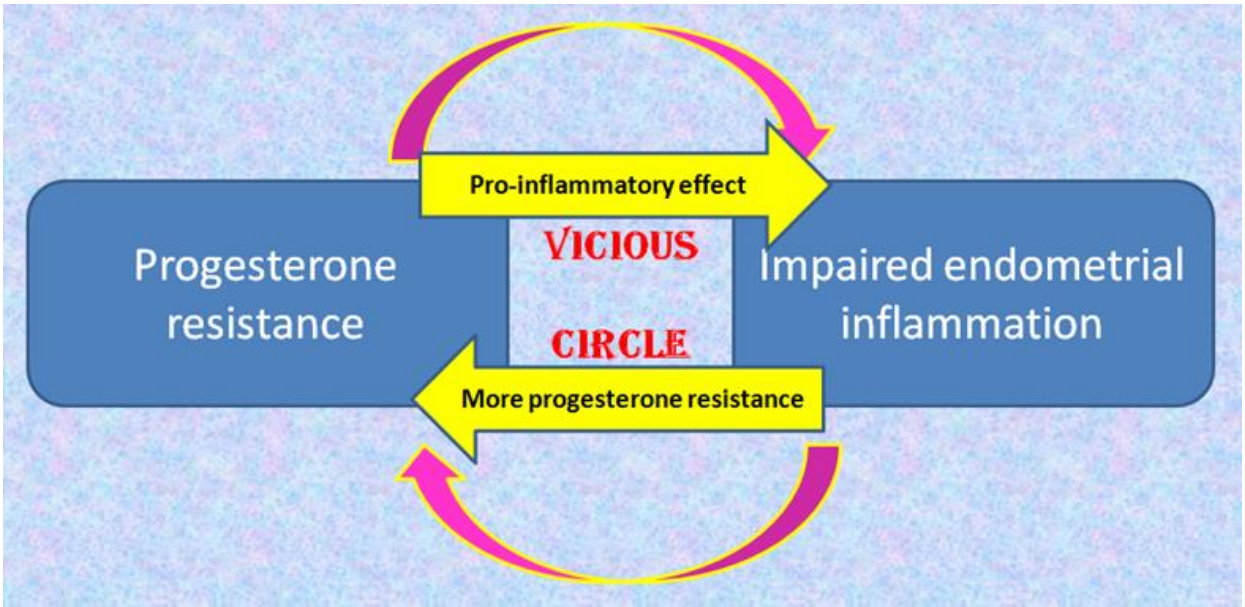


Fig 1: The main changes in the eutopic endometrium of patients with endometriosis: vicious circle

Progesterone resistance negatively interferes with this physiological process and results in a vicious circle. On the one hand, a pro-inflammatory environment facilitated by progesterone resistance, and subsequently aggravating it.

This explains why chronic endometritis (CE) was reported to be highly associated with endometriosis (12). However, CE, as currently defined, is a problematic entity. In fact, it is consensually accepted as a chronic inflammation within the endometrium, caused only by germs and to be treated exclusively with antibiotics (13-14). This is a definition we strongly criticize for many basic reasons. On the one hand, the only randomized control trial assessing the impact of antibiotics did not support their effectiveness in terms of reproduction (15). On the other hand, chronic inflammation is a capital component of the normal endometrium (8). In fact, the normal menstrual cycle has always offered an extraordinary template for physiologists and immunologists to study inflammation, as it involves cyclical injury, bleeding, pain, pro-resolving self-limiting healing, regeneration of the mucosa, recruitment of inflammatory cells in the secretory phase whose cytotoxic effect is kept inhibited by progesterone (11). After the drop of the hormone at the end of the cycle, the immune cells resume their cytotoxic activity and contribute to the shedding of the mucosa (10). Consequently, chronic inflammation is a normal component of the endometrium, and only becomes problematic when impaired, when the inflammatory balance is broken in favor of the pro-inflammatory mechanisms over the anti-inflammatory ones (8). Another basic fact in immunology is not only germs can trigger an inflammatory response. Endometriosis is a perfect demonstration of an inflammatory disease, not caused by germs, but by the presence of an inflammatory tissue in ectopic locations. It provides another illustration of the concept we defend, termed “impaired inflammatory state of the endometrium” (IISE), as opposed to CE (8). In case of endometriosis, chronic perturbed inflammation results in a chronic IISE (C-IISE)

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

The consequences of C-IISE and chronic state of progesterone resistance on eutopic endometrium:

Although the most frequently mentioned consequences are infertility, implantation failure and miscarriage, the long term complications can be much more dramatic because progesterone resistance and C-IISE provide the optimal ground for abnormal proliferation, with areas of non shed endometrium, ultimately resulting in an endometrial cancer (8). Less severe intermediate proliferative conditions are more likely to occur in this context: endometrial polyps and hyperplasia (8,16).

In fact, many studies have provided epidemiological evidence that endometrial carcinogenesis could be promoted by an inflammatory milieu (17-19). It is no wonder that endometriosis is associated with a higher risk of endometrial cancer (20). A nationwide population based Taiwanese cohort study clearly showed increased risk of endometrial cancer in the later life of patients with endometriosis (21). Nevertheless, larger investigations are needed.

Practical implications: hysteroscopy in patients with endometriosis.

Growing awareness of the changes endometriosis causes in the eutopic endometrium leads to a more thoughtful practice, with better knowledge regarding the anomalies to be careful about.

Progesterone resistance and impaired inflammation are the core problem, and still, two sides of a single coin. IISE is the very first change that occurs in the eutopic endometrium. However, even expert hysteroscopic surgeons might give limited attention to inflammatory mucosa and simplistically conclude “normal hysteroscopy” when no synechia or “overgrowths” are visible inside the cavity. In Figure 2, we report the hysteroscopic iconography of a 30 years old patient with a medical history of endometriosis, 4 failed IVF and 3 hysteroscopies performed by expert hysteroscopists, all concluding “normal hysteroscopy” whereas redness was noticeable in the images printed with the descriptive report. When performing her last hysteroscopy required by the new assisted reproductive technology center, subtle inflammatory patterns were identified: bleeding, redness, petechiae, irregular proliferation and focal defects. A targeted biopsy, performed within a complex inflammatory lesion comprising defect and hyperemia, allowed the diagnosis of dysfunctional endometrium with plasma cells to be posed. The patient received antibiotics, anti-inflammatory drugs and GnRH before a new IVF, followed by low dose aspirin. This resulted in a successful twin pregnancy with live births.

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

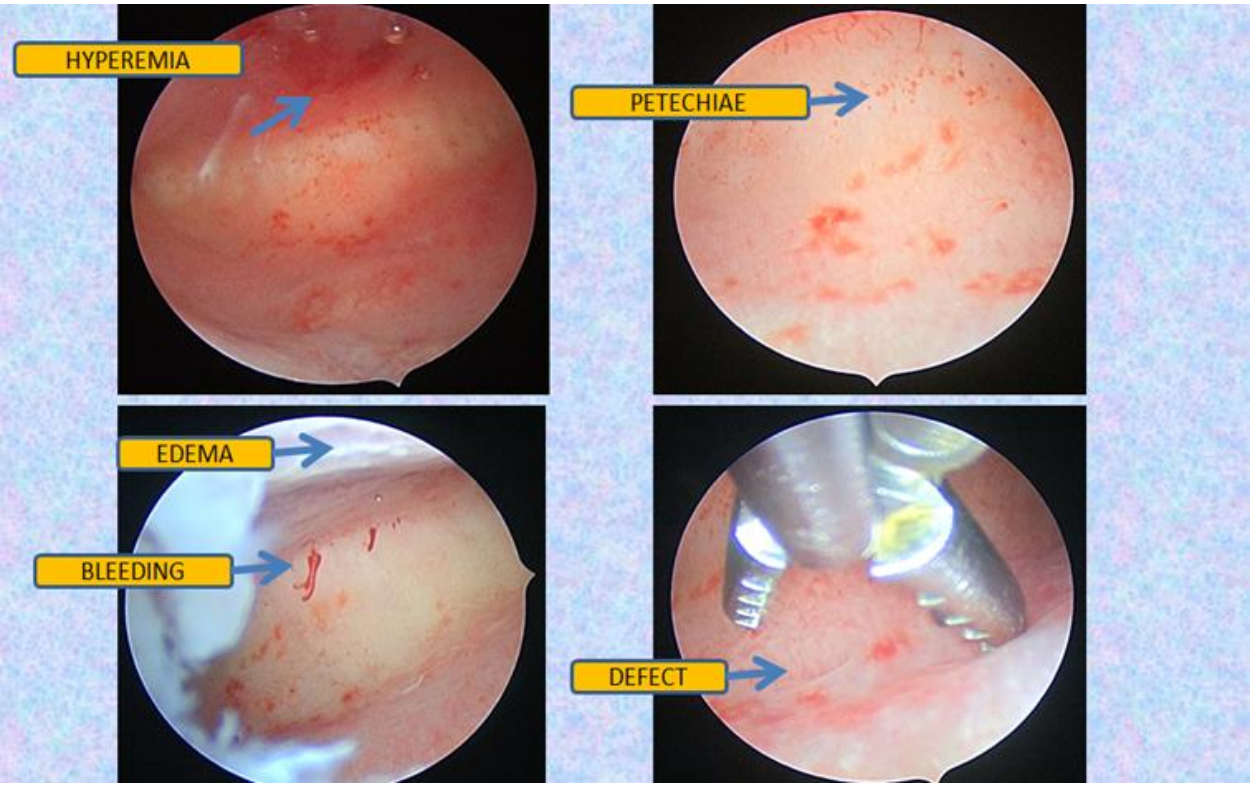


Fig 2: Subtle signs of IISE in a 30 years old patient with a history of 4 failed IVFs.

Another typical sign of chronic IISE are micropolyps. Very interestingly, studies revealed their rich content in inflammatory cells, among which plasma cells (22). The biopsy should optimally target the areas containing these inflammatory lesions (Fig 3).

In a recent article was proposed a simplified protocol of hysteroscopic signs suggestive of dysfunctional inflammatory endometrium, founded on a histopathological basis (23). Among the new hysteroscopic criteria are the irregular interglandular spacing, and focal areas of corrugated surface due to irregular thickness (Fig 3)

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

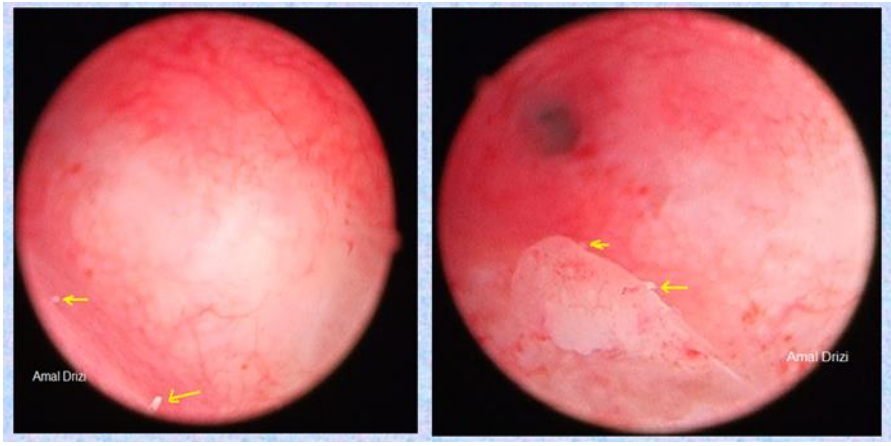


Fig 3: Micropolyps defining the targeted biopsy site.

Another consequence of persistent IISE with progesterone resistance is enhanced vascularity (Fig 4) and proliferative disorders, ranging from polyps to carcinoma.

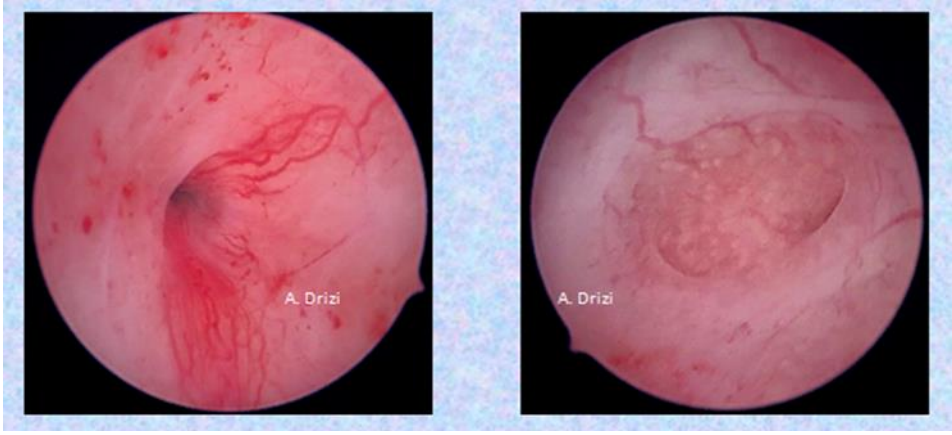


Fig 4: enhanced regular vascularity (adénomyosis).

In patients with endometriosis, particular attention has to be paid to the presence of endometrial polyps (16). The context of chronic inflammatory environment and progesterone resistance caused by endometriosis theoretically benefits volume, number and recurrence of polyps, ultimately resulting in a polypoid hyperplasia. The latter is either focal or diffuse, with or without atypia (Fig 5). All the figures shared are from patients with documented endometriosis.

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

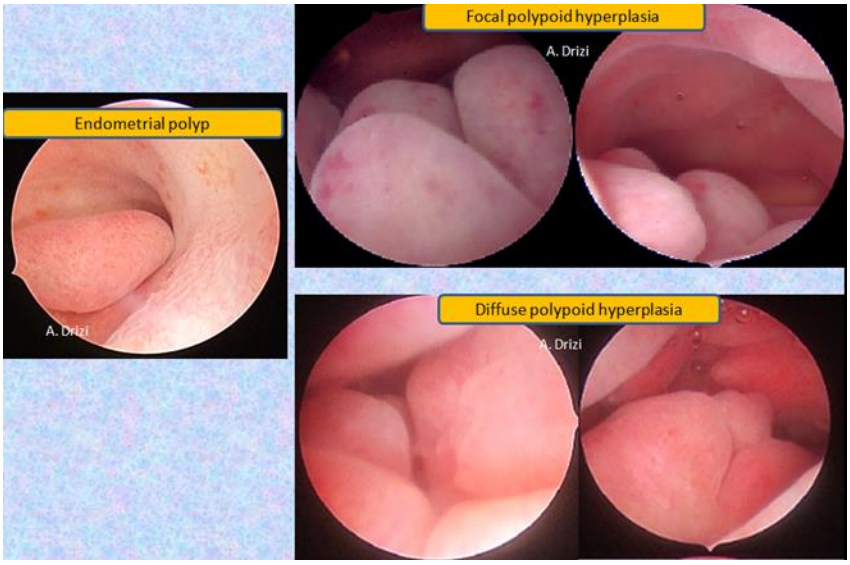


Fig 5: polypoid endometrium. In the left: unique polyp with an irregularly thick surrounding endometrium; in the right: focal and diffuse polypoid hyperplasia without atypia

In our practice of hysteroscopy, it is important to remember that hyperplasia does not always present in massive polyploid patterns. It could develop in a more subtle way, requiring more attention. In figure 6, a focal hyperplasia is diagnosed in a patient with endometriosis and adenomyosis, initially presenting as a hardly visible bump in the posterior lateral wall. Closer view reveals the thickening of the endometrium, which was sampled. Anatompathological examination confirmed adenomyosis, hyperplasia without atypia and IISE.

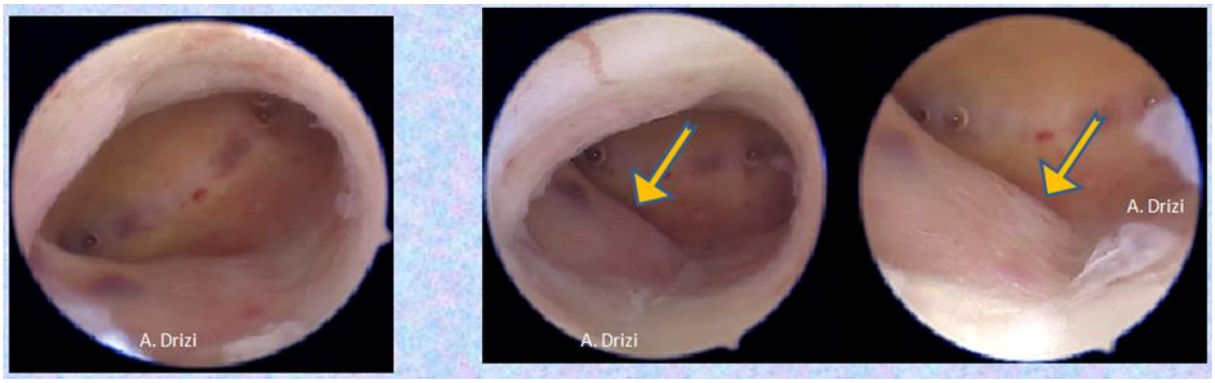


Figure 6: focal hyperplasia without atypia in a patient with endometriosis and adenomyosis.

Moreover, when hyperplasia is uniformly diffuse, it leads to more difficulties at hysteroscopy. The role of ultrasound comes in handy in these situations, demonstrating a uniformly abnormally thickened endometrium for the phase of the menstrual cycle (Fig 7).

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

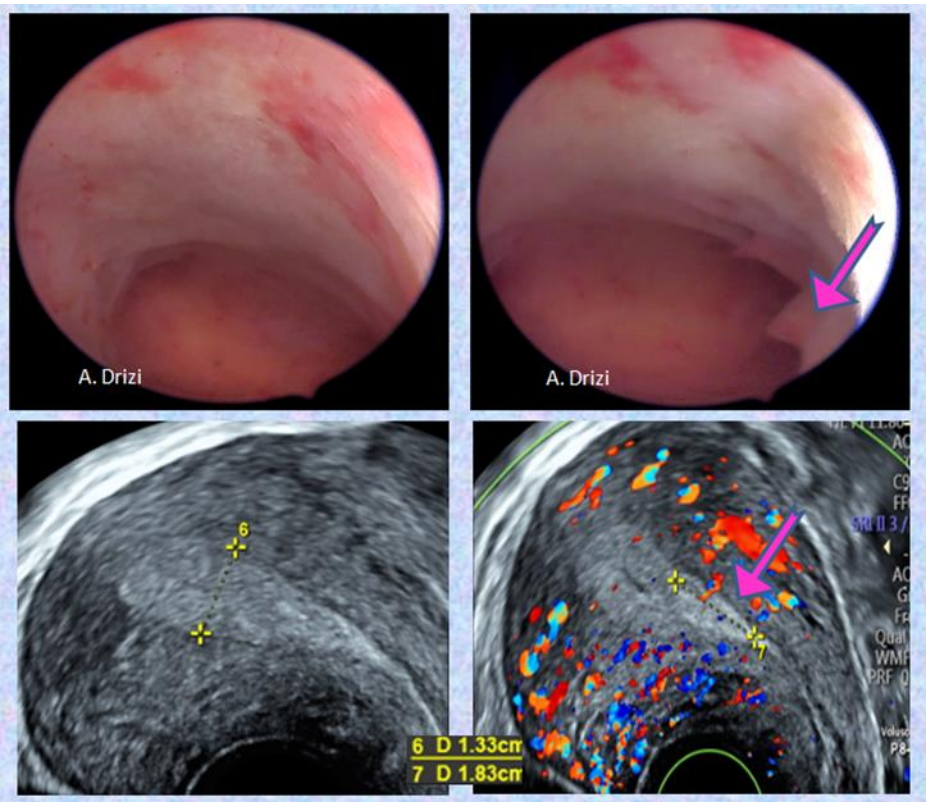


Fig 7: Uniformly diffuse hyperplasia with a focal polypoid thinckening (adenomyosis)

The chronic progesterone resistance state which characterizes the eutopic endometrium of patients with endometriosis, theoretically explains the issues of slow response to progesterone therapy and recurrence of hyperplasia we experience in our practice with this condition. This needs to be properly assessed in large studies and in the meantime, taken into consideration for the patients' benefit.

Growing awareness about the various changes in the eutopic endometrium of women with endometriosis highlights the importance of monitoring the endometrium of these patients at least with ultrasound, and when indicated, with hysteroscopy. Our paper stresses the importance of a more thoughtful practice of hysteroscopy when indicated in these patients. However, although the eutopic endometrium of patients with endometriosis already appears important to monitor, more studies are necessary on different levels. On the one hand, the prevalence of the above-mentioned changes need to be more properly assessed in endometriosis patients as compared to women without endometriosis. On the other hand, the correlations between hysteroscopic images and histopathology need to be seriously developed. Unfortunately, few studies are available in this area, as the practice of diagnostic hysteroscopy faces serious issues in terms of standardization, especially in terms of examination and sampling techniques, explaining an extremely heterogeneous practice in the different parts of the world. Blind sampling continues to be widely performed, even by hysteroscopists sometimes. This is strongly impacting research in the negative way.

Other obstacles which are seriously hindering hysteroscopy are the higher cost as well as the

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

lack of accessibility to this technology in many parts of the world. However, the major issue from our perspective is the limited interest of hysteroscopists themselves in developing diagnostic hysteroscopy as operative hysteroscopy continues to draw almost all the attention. Growing awareness of endometrial physiology and pathology needs to be a prerequisite for this practice, not only for hysteroscopists but for pathologists as well.

Conclusion:

Because of the significant impact of endometriosis on eutopic endometrium, hysteroscopists need to grow awareness of the various changes caused within the mucosa. Endometriosis is documented to be significantly associated with IISE, progesterone resistance, endometrial polyps and carcinoma. The eutopic endometrium of women with endometriosis needs to be added to the list of the parameters to monitor in the long term by ultrasound, and in case of suspected pathology, by hysteroscopy. For this, further studies are necessary.

References:

1.Liutkeviciene R; Bumbuliene Z; Zakareviciene J. Density of nerve fibres in eutopic endometrium in women with endometriosis. Open Medicine. 2013;8(2):141-5. https://doi.org/10.2478/s11536-012-0122-9

2.Ejskjaer K, Sorensen BS, Poulsen SS, Mogensen O, Forman A, Nexo E. Expression of the epidermal growth factor system in eutopic endometrium from women with endometriosis differs from that in endometrium from healthy women. Gynecol Obstet Invest. 2009;67(2):118-26. doi: 10.1159/000167798.

3.Méar L, Com E, Fathallah K, et al. The Eutopic Endometrium Proteome in Endometriosis Reveals Candidate Markers and Molecular Mechanisms of Physiopathology. Diagnostics (Basel). 2022;6;12(2):419. doi: 10.3390/diagnostics12020419.

4.Hwang JH, Oh JJ, Wang T, et al. Identification of biomarkers for endometriosis in eutopic endometrial cells from patients with endometriosis using a proteomics approach. Mol Med Rep. 2013;8(1):183-8. doi: 10.3892/mmr.2013.1469.

5.Liu H, Lang JH. Is abnormal eutopic endometrium the cause of endometriosis? The role of eutopic endometrium in pathogenesis of endometriosis. Med Sci Monit. 2011;17(4):RA92-9. doi: 10.12659/msm.881707.

6.Brosens I, Brosens JJ, Benagiano G. The eutopic endometrium in endometriosis: are the changes of clinical significance? Reprod Biomed Online. 2012;24(5):496-502. doi: 10.1016/j.rbmo.2012.01.022.

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

7.Patel BG, Rudnicki M, Yu J, Shu Y, Taylor RN. Progesterone resistance in endometriosis: origins, consequences and interventions. Acta Obstet Gynecol Scand. 2017;96(6):623-632. doi: 10.1111/aogs.13156.

8.Drizi A, Djokovic D, Laganà AS, van Herendael B. Impaired inflammatory state of the endometrium: a multifaceted approach to endometrial inflammation. Current insights and future directions. Prz Menopauzalny. 2020;19(2):90-100. doi:10.5114/pm.2020.97863

9.Lessey BA, Lebovic DI, Taylor RN. Eutopic endometrium in women with endometriosis: ground zero for the study of implantation defects. Semin Reprod Med. 2013;31(2):109-24. doi: 10.1055/s-0032-1333476.

10.Kodama T, Hara T, Okamoto E, Kusunoki Y, Ohama K. Characteristic changes of large granular lymphocytes that strongly express CD56 in endometrium during the menstrual cycle and early pregnancy. Hum Reprod. 1998;13(4):1036-43. doi: 10.1093/humrep/13.4.1036.

11.Maybin JA, Critchley HO. Menstrual physiology: implications for endometrial pathology and beyond. Hum Reprod Update. 2015;21(6):748-61. doi: 10.1093/humupd/dmv038.

12.Cicinelli E, Trojano G, Mastromauro M, et al. Higher prevalence of chronic endometritis in women with endometriosis: a possible etiopathogenetic link. Fertil Steril. 2017;108(2):289-295.e1. doi: 10.1016/j.fertnstert.2017.05.016.

13.Cicinelli E, Resta L, Loizzi V, et al. Antibiotic therapy versus no treatment for chronic endometritis: a case-control study. Fertil Steril. 2021;115(6):1541-1548. doi: 10.1016/j.fertnstert.2021.01.018.

14.Kitaya K, Ishikawa T. Chronic endometritis: simple can be harder than complex? Fertil Steril. 2021;115(6):1443-1444. doi: 10.1016/j.fertnstert.2021.03.023.

15.Song D, He Y, Wang X, et al. Impact of antibiotic therapy on the rate of negative test results for chronic endometritis: a prospective randomized control trial. Fertil Steril. 2021;115(6):1549-1556. doi: https://doi.org/10.1016/j.fertnstert.2020.12.019

16.Zheng, QM., Mao, Hl., Zhao, YJ. et al. Risk of endometrial polyps in women with endometriosis: a meta-analysis. Reprod Biol Endocrinol. 2015 ;13:103. https://doi.org/10.1186/s12958-015-0092-2

17.Ali AT. Risk factors for endometrial cancer. Ceska Gynekol. 2013;78(5):448-59. PMID: 24313431.

18.Jabbour H, Sales K, Catalano R, Norman J. Inflammatory pathways in female reproductive health and disease. Focus on Vascular Function in Female Reproduction. Reproduction. 2009;138(6):903–19.

19.Dossus L, Rinaldi S, Becker S, et al. Obesity, inflammatory markers, and endometrial cancer risk: a prospective case-control study. Endocr Relat Cancer. 2010;17(4):1007-19. doi: 10.1677/ERC-10-0053.

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

20.Terzic M, Aimagambetova G, Kunz J, Bapayeva G, Aitbayeva B, Terzic S, Laganà AS. Molecular Basis of Endometriosis and Endometrial Cancer: Current Knowledge and Future Perspectives. Int J Mol Sci. 2021;22(17):9274. doi: 10.3390/ijms22179274.

21.Yu HC, Lin CY, Chang WC, et al. Increased association between endometriosis and endometrial cancer: a nationwide population-based retrospective cohort study. Int J Gynecol Cancer. 2015;25(3):447-452. doi:10.1097/IGC.0000000000000384

22.Cicinelli E, Resta L, Nicoletti R, Zappimbulso V, Tartagni M, Saliani N. Endometrial micropolyps at fluid hysteroscopy suggest the existence of chronic endometritis. Hum Reprod. 2005;20(5):1386-9. doi: 10.1093/humrep/deh779.

23.Drizi A, Ghahremani M, van Herendael BJ. Correlations between hysteroscopy and histopathology to consider for the diagnosis of impaired inflammatory states of the endometrium: a narrative review. It. J Gynaecol. Obstet. Online first, xx-xx. doi: 10.36129/jog.2022.43

Corresponding author: Amal Drizi
DOI: 10.36205/ trocar3.2022002
Received 7-2022 - Accepted 8 - 2022

The Trocar Official Online Journal of ISGE

The Trocar Issue 3 Volume 3 / Page 33 - 43 ISSN: 2736-5530

Hybrid v-NOTES: Laparoscopic-Assisted vaginal Natural Orifice Transluminal Endoscopic Surgery (LAv-NOTES): Case report and new hybrid technique in complex gynecological surgery.

Author: Carlos Leal MD, PhD [1], Víctor Alejandro Rubio MD [1], Jesús Villegas MD [1], Miguel Guigón MD[1], Yousset García MD [1,] Manuel Rodríguez MD[1].

Affiliation: Dep. Ob. Gyn. Gyn- Oncology, Universidad Autónoma de Chihuahua, Hospital Christus Muguerza Del Parque, Chihuahua Mexico.

Abstract

Hysterectomy is usually performed for the surgical treatment of several benign disorders of the female pelvis. At present, there are four surgical approaches: Vaginal Hysterectomy (VH), abdominal hysterectomy (AH), Laparoscopic hysterectomy (LH), and robot-assisted hysterectomy (RH). In agreement with the literature, AH remains the most frequently elected route for benign indications. Nevertheless, VH is superior to AH, LH, and RH. VH is the safest and least invasive (cosmesis) approach, with the advantage of a faster return to daily activities. Therefore, VH is the first choice when technically possible, as recommended by the International Society for Gynecology Endoscopy (ISGE), The American College of Obstetricians and Gynecologists (ACOG), and the American Association of Gynecologic Laparoscopists (AAGL). Natural orifice transluminal endoscopic surgery (NOTES) is a new development in the field of minimally invasive surgery. The v-NOTES technique seems to be a safe, effective, and less invasive alternative to performing a hysterectomy in very complex cases with a large uterus.

Keywords:

v-NOTES, laparoscopy, minimally invasive surgery, new surgical technique, novel minimally invasive technique

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

Introduction:

Hysterectomy is usually performed to manage several benign disorders of the female pelvis. At least through 2005, approximately 600,000 procedures were performed in the United States, annually, with more than two-thirds performed through an abdominal incision despite the existence of the less invasive vaginal and laparoscopic approaches, which are associated with reduced morbidity and faster return to normal activities [1,2]. Hysterectomy remains one of the most frequently performed surgeries. At present, there are four surgical approaches: Vaginal Hysterectomy (VH), abdominal hysterectomy (AH), Laparoscopic Hysterectomy (LH), and robot-assisted hysterectomy (RH). In agreement with the literature, AH remains. the most frequently chosen route for benign indications. Nevertheless, VH is superior to AH, LH, and RH. VH is the safest and least invasive approach, with the advantage of a faster return to daily activities. Therefore, VH is the first choice when technically possible, as recommended by the International Society for Gynecology Endoscopy (ISGE), The American College of Obstetricians and Gynecologists (ACOG), and the American Association of Gynecologic Laparoscopists (AAGL). Technical feasibility strongly depends on the surgeons' experience in VH, unfortunate, VH is less taught to the new gynecologist generations. Certain patient characteristics (Large uterine size, narrow vagina, absence of uterine descent, and history of cesarean sections) are known to limit vaginal accessibility [3].

Natural orifice transluminal endoscopic surgery (NOTES) is a new development in minimally invasive surgery. NOTES uses the natural orifices of the body, such as the umbilicus, mouth, anus, urethra, and vagina. Most NOTES procedures have been performed transvaginal, and Its benefits include cosmesis and reduced pain compared to conventional methods [4]. The NOTES procedures have been applied in the field of general surgery since 2007 and have Primarily used the vagina as the access route, the first hysterectomy using the NOTES procedure was done by Su et al.in 2012 [5,6,7]; Since then, several studies have demonstrated the feasibility and safety of this technique. Minimally invasive surgeries, including NOTES, have become popular, and more surgeons are beginning to use this procedure, which provides safe entry, easy access, and direct visualization of the surgical abdominal field. With the advent of new technology, better cameras, new optic fibers, advanced energy devices, and all the new instrumentation that is coming up daily, gynecological surgeons tend to operate on more complex cases via minimally invasive surgery. This study is based and lined on the SCARE guideline criteria, which consist of a 14-item checklist to improve the quality of surgical case reports [8].

In hybrid NOTES, the surgery is performed through a natural body orifice with an abdominal optic view.

The main objective of our study is to show a new hybrid technique in gynecological surgery that allows us to perform hysterectomy + salpingectomy with ovarian preservation in a very complicated case with a very large uterus (34/week gestation line).

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

This hybrid new technique is named Laparoscopic Assisted vaginal Natural Orifice Transluminal Endoscopic Surgery (LAv-NOTES).

Material Method:

Presentation of a case:

A 42-year-old woman with gravida 0, with no desire to procreate, was referred to our institution, with a history of crampy abdominal pain that was getting worse over time and heavy vaginal bleedings. She was seen in another medical center with hemoglobin levels as low as seven g/dl. she received a blood transfusion of 2 units of red cell concentrates (RCC). The hemoglobin level on the pre-op test was 12.3g/dl, 9.1 g/dl twelve hours after the procedure, and three weeks after the surgery the hemoglobin level was 12.1 g/dl. It is believed she was hemodiluted by intravenous fluids during the surgery. Otherwise, the medical history is unremarkable.

A large mass was evident on the abdomen, getting into the 34/weeks of gestation clinically.

An office, pelvic ultrasound was performed evidenciating multiple very large uterine myomas with negative doppler [Fig 1]. An MRI showed multiple large-size myomas or poly-myomatous uterus occupying almost 70% of the abdomen [Fig 2], [Supp. Fig 1]. Tumor markers were negative, no suspicion of malignancy. The patient had no contraindications for surgery.

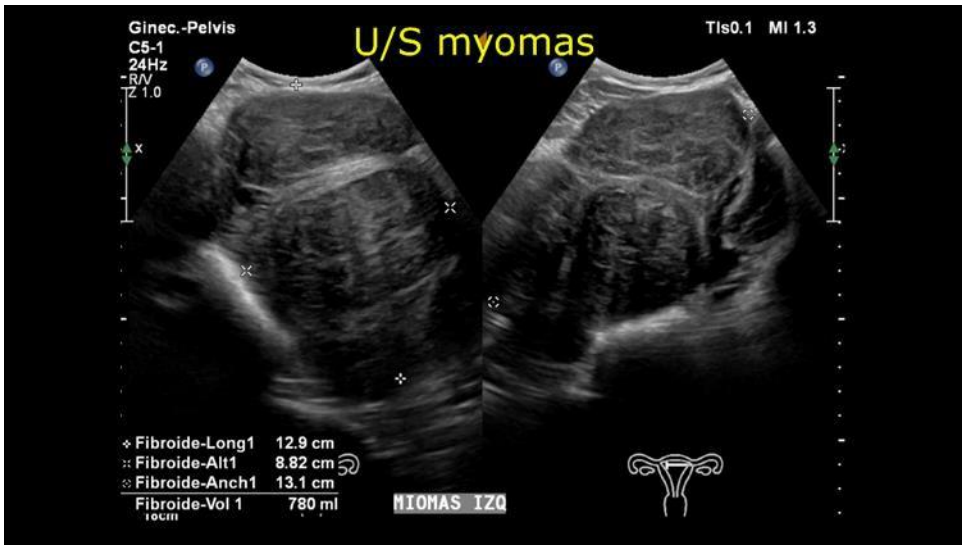
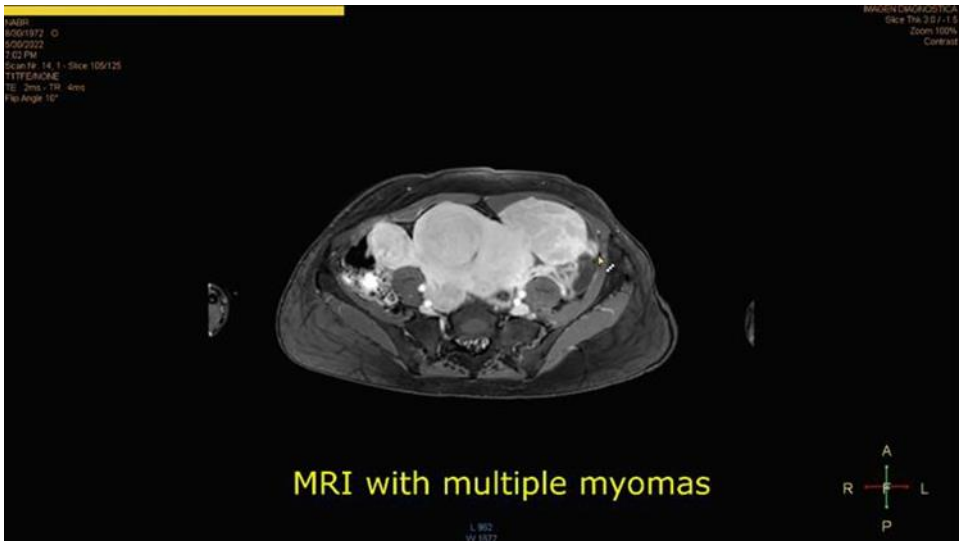


Fig 1 Abdominopelvic U/S

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022



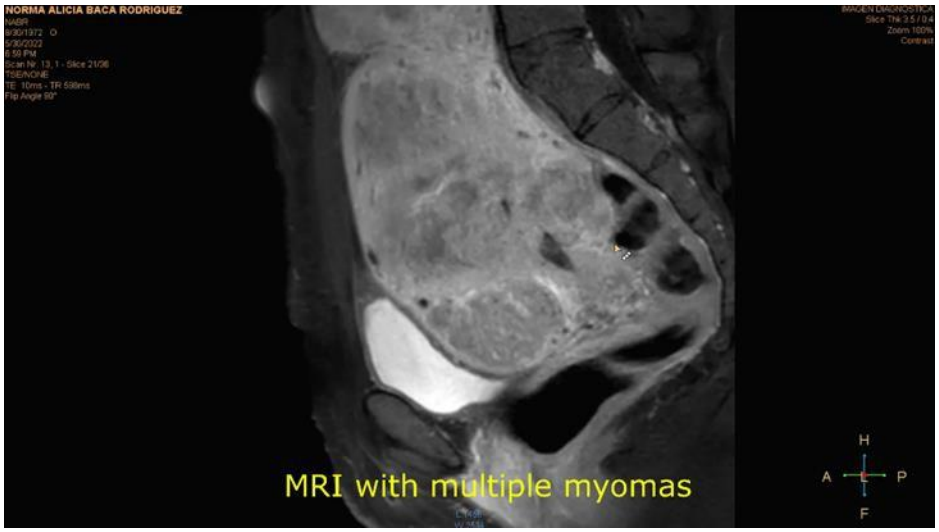


Fig 2 fibroids on MRI

The Body Mass Index is (BMI) 19.05 kg/m2 decimal precision two within the average weight.

The clinical picture was discussed with the patient, and the decision was to have a Total hysterectomy + bilateral salpingectomy with ovarian preservation. The patient was informed of Hybrid v-NOTES, and signed the consent. The LAv-NOTES technique was planned due to the expected complexity of the procedure. The day before surgery, a myoma mapping was done with U/S [Supp. Fig 10].

There was two surgical teams a gynecology oncologist MIGS (minimally invasive gynecological surgeon) specialist; described as surgeon one and his assistant, fellow (FMIGS 2nd year) MIGS with one assistant (FMIGD 2nd year), one anesthesiologist, and one surgical Nurse [Supp. Fig 12]. During the intervention, the first step was the

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

abdominal approach here the operation field was prepared and draped. The Verres needle was placed in Palmer point and the CO2 distention was initiated [Supp. Fig 2], then the first port was inserted 20 cm above the umbilicus [Supp. Fig 3], we used a telescope of 11mm with a 0° fore oblique lens, and four 5mm accessory ports were used on each side of the abdomen, with as energy source the LigaSure™ Retractable L-Hook laparoscopic sealer/divider (Medtronic™, Minneapolis, MN, USA). The bilateral salpingectomy thereafter a myomectomy of the pedunculated myomas was performed [Supp. Fig 4]. During the vaginal time, a Foley catheter was placed, the Gel Port® (Applied Medical™, Rancho Santa Margarita, CA, USA) was inserted, and CO2 was insufflated up to 12 mm Hg to maintain an adequate pneumovagina with the use of a 30°mm scope and Enseal® G2 (Ethicon®Endo-Surgery, Cincinnati, OH, USA). The cervix was pulled with Pozzi forceps and then circumcised with a sharp knife.; previously hydrosulfate with 10cm of lidocaine + epinephrine at the anterior fornix, the vaginal mucosa, and the bladder were pushed up along the uterine-cervical fascia whilst traction on the cervix was maintained.

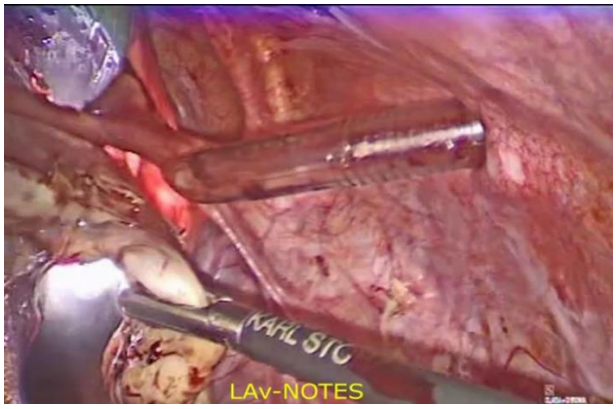
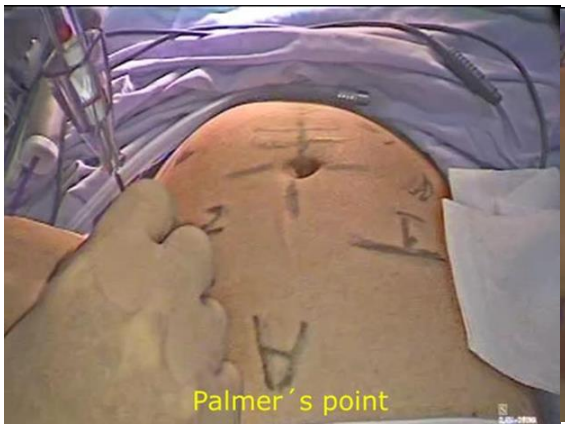


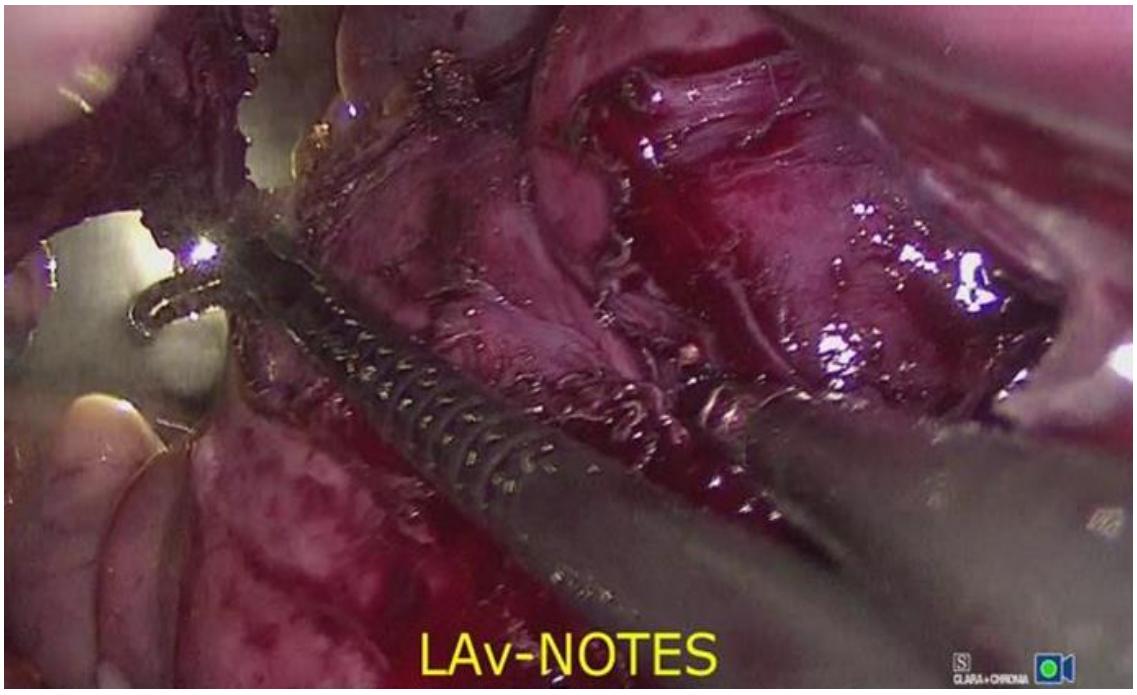
Fig 3 LAv-NOTES

Once the peritoneum between the bladder and the uterus was identified, it was opened using cold scissors. The same technique was used in the posterior fornix until the peritoneum of the pouch of Douglas was visualized and opened. Once the anterior and posterior peritoneum was opened, both sacro-uterine ligaments were identified, clamped, and cut using cold scissors then ligated with Vycril- 1® (Ethicon®, Piscataway, NJ). The following step was to put the Alexis retractor and the Gel port ® [Supp. Fig 6, Fig 8] (Applied Medical™, Rancho Santa Margarita, CA, USA.) An Alexis O Wound Protector/Retractor (Applied Medical™, Rancho Santa Margarita, CA, USA.) was placed in the pouch of Douglas then, the hysterectomy was performed, caudally to cranially, the remainder of the parametrium, the uterine arteries, and the ovarian ligament were cut and coagulated with advanced Bipolar energy, Enseal® G2 (Ethicon®Endo-Surgery, Cincinnati, OH, USA). [Supp. Fig 5 and 9]. The laparoscopic time was 124 minutes, and for vaginal time, 34 minutes [Supp. Fig 7 and 11], considering that both procedures were done at the same time. After hemostasis, the pneumoperitoneum was deflated, and the port device was removed. The uterus with the myomas was morcellated with a knife and extracted per vagina, and the colpotomy was vaginaly sutured using a Vicryl-1 ® (Ethicon®, Piscataway, NJ) suture. The abdominal 11mm port was closed with 2 Vicryl-2 ®, and all 5 mm ports were closed with Monocryl 4-0 (Ethicon®). The patient's recovery was unremarkable, and she was discharged 32 hours after the surgery. The total weight of the uterus and myomas were 2285 grams. The pathology report came back as benign myomas.

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022



Entry abdominal



Laparoscopic view of the pediculated abdominal pedunculated myomas Ovarian ligament was cut and coagulated with advanced bipolar energy, Enseal ® using LAv-NOTES.

Results:

We report a case of a hysterectomy and salpingectomy with ovarian preservation using LAv-NOTES being successfully performed on a patient with a very large poly-myomatous complicated uterus.

Discussion:

A thorough literature search has suggested that this is the first reported case doing a hysterectomy and salpingectomy with ovarian preservation using LAv-NOTES being successfully performed on a patient with a very large poly-myomatous uterus. The advantages were a double vision in the surgical field, the advantage being that anatomical

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

structures were well visible and perfectly identifiable, minimizing the possibility of complications [Fig 3]. The LAv-NOTES technique is a way to invert the limitations of VH whilst maintaining its benefits, with the additional benefit of laparoscopic surgery. The significant differences between v-NOTES and LAv-NOTES are that in both situations it is possible to perform vaginal hysterectomy with the advantages described above but with LAv-NOTES additional information on the status of the abdominal cavity is provided, in addition to direct visualization of the ureters, the pelvic vessels, and important anatomical structures and complications are prevented in difficult cases. With this new technique, we are proving the facility to perform safe surgery in very complex cases like a large uterine size, stretched vagina, no uterine descent, or recently the number of cesareans sections, adhesions, and multiple surgeries are known to restrain vaginal accessibility.

A 2010 survey reported that residents and their program directors believed that graduating residents were not prepared to perform most types of hysterectomies. Only 38% of program directors and 28% of residents believed that residents were prepared entirely to perform TVH. Those numbers dropped to 29% and 22% for TLH [9].

We believe that young gynecologists or residents will be more confident with this surgical approach to performing hysterectomies. Then, the learning curve will be shorter for hybrid LAv-NOTES because the surgeon can see the anatomy from two points of view, abdominal and vaginal, therefore, LAv-NOTES can extend the scope and capability of conventional v-NOTES. The concept of minimally invasive surgery offers the advantage of minor trauma to the abdominal wall, shorter hospital stays, less pain, and fast recovery can be duplicated in hybrid LAv-NOTES. We believe that this new technique will change the surgical approach for very complex cases with a large uterus, keeping in mind that the cost will be higher, but the recovery, the safety, and the less invasive surgery will compensate.

Katrien Nulens, MD et al. published a Retrospective Cohort Study of 114 Patients on their data. The v-NOTES technique seems to be a safe, effective, and less invasive alternative to performing a hysterectomy in cases with a large uterus. Following the ISGE guidelines (that recommend AH in cases with an expected large uterus >280 g, especially when vaginal accessibility is limited), a laparotomy would have been proposed to most of the women in this study, whereas a v-NOTES hysterectomy was performed without needing conversion in 99% of the patients. [10].

Conclusion:

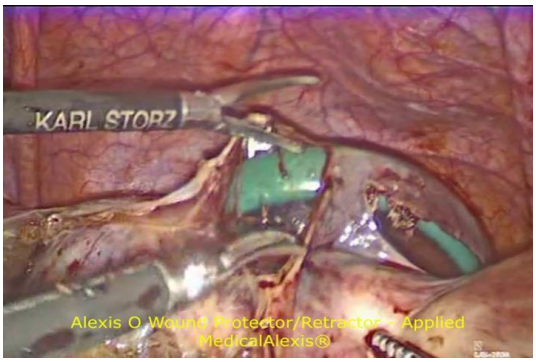
The most performed procedure at present time is the hysterectomy, with the new hybrid surgical technique called, LAv-NOTES we can bring the procedure directly into the field of minimally invasive surgery with the advantages that vaginal hysterectomy offers, but without the disadvantages it, since this technique allows for a direct vision into the abdominal cavity, , and copes with the challenges in complex surgeries such as the very large uterus or poly-myomatous uterus.

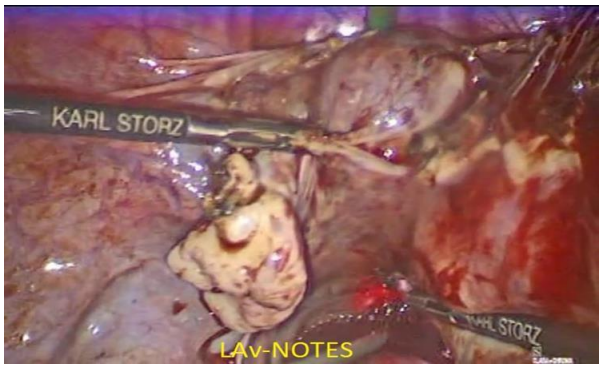
More publications about v-NOTES are emerging in the gynecological surgical field, we need more evidence to prove the feasibility of this procedure. In the meantime, we started to apply the LAv-NOTES as the best choice for complex gynecological cases. Comparative studies to evaluate perioperatively outcomes of the patients are needed.

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

OR Setting:

Alexis O Wound Protector/Retractor - Applied Medical®

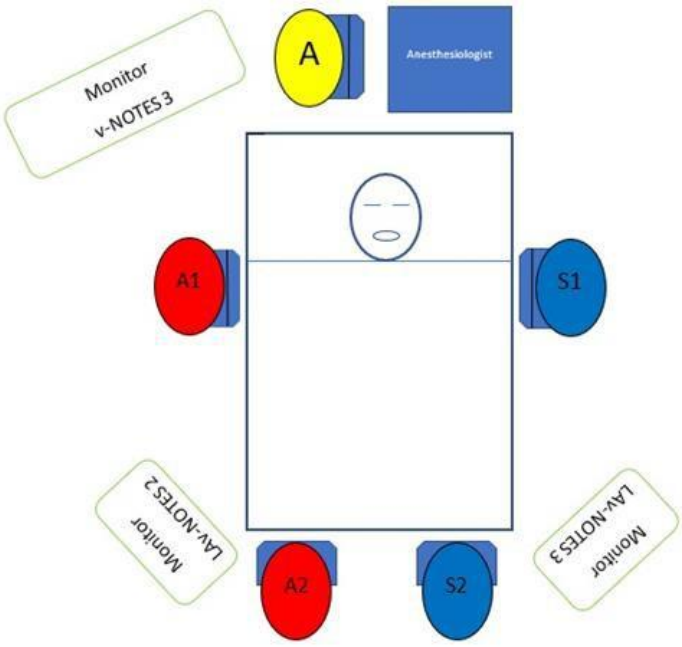




LAv-NOTES U/S Mapping the day before surgery

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

This diagram shows the surgical team positions and the monitors. Surgeon 1(S1) is the Gynecology Oncology Surgeon, a specialist in MIGS; (A 1) was his assistant; Surgeon 2 (S2) was a MIGS Gynecologist, and (A 2) was his assistant (the assistants were FMIGS 2nd year).



DOI:

References:

1.- AAGL Position Statement: Route of Hysterectomy to Treat Benign Uterine Disease. Journal of Minimally Invasive Gynecology, Vol 18, No 1, January/February 2011. DOI: 10.1016/j.jmig.2010.10.001

2.-Douglas Luchristt, MD, MPH; Oluwateniola Brown, MD; Kimberly Kenton, MD, MS; C. Bretschneider, MD; Trends in operative time and outcomes in minimally invasive hysterectomy from 2008 to 2018; American Journal of Obstetrics & Gynecology February 2021. DOI.org/10.1016/j.ajog.2020.08.014

3.- Margaux Merlier, MD, Pierre Collinet, MD, Ph.D., Adeline Pierache, BS, David Vandendriessche, MD, Victoire Delporte, MD, Chrystele Rubod, MD, Ph.D., Michel Cosson, MD, Ph.D., and Geraldine Giraudet, MD Is V-NOTES Hysterectomy as Safe and Feasible as Outpatient Surgery Compared with Vaginal Hysterectomy? Journal of Minimally Invasive Gynecology. Vol 29, No 5, May2022.DOI.org/10.1016/j.jmig.2022.01.007

4.- Hasan Terzi, Unal Turkay, Navdar Dogus Uzun∗, Mehmet Salıcı; Hysterectomy and salpingo-oophorectomy by transvaginal natural orifice transluminal endoscopic surgery (V-NOTES) assisted by an umbilical camera: Case report and new hybrid technique in gynecology; International Journal Of Surgery Case Reports 51 (2018) 349–351. DOI.org/10.1016/j.ijscr.2018.08.053

5.- R. Zorron, M. Filgueiras, L.C. Maggioni, L. Pombo, G. Lopes Carvalho, A. Lacerda Oliveira, NOTES. Transvaginal cholecystectomy: report of the first case, Surg. Innov. 14 (2007) 279–283.DOI.org/10.1177/1553350607311090

6.- J. Marescaux, B. Dallemagne, S. Perretta, A. Wattiez, D. Mutter, D. Coumaros, Surgery without Scars: report of transluminal cholecystectomy in a human being, Arch. Surg. 142 (2007) 823–826 DOI:10.1001/archsurg.142.9.823.

7.- J. Baekelandt, P.A. De Mulder, I. Le Roy, C. Mathieu, A. Laenen, P. Enzlin, S.Weyers, B.W. Mol, J.J. Bosteels, Postoperative outcomes and quality of life following hysterectomy by natural orifice Transluminal endoscopic surgery (NOTES) compared to laparoscopy in women with a non-prolapsed Uterus and benign gynecological disease: a systematic review and meta-analysis, Eur. J. Obstet. Gynecol. Reprod. Biol. 208 (January) (2017) 6–15; DOI.org/10.1016/j.ejogrb.2016.10.044

8.- R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgill, for the SCARE Group, The SCARE statement: consensus-based surgical case report guidelines, Int. J. Surg. 34 (2016) 180–186. DOI.org/10.1016/j.ijsu.2016.08.014

9.-Douglas Luchristt, MD, MPH; Oluwateniola Brown, MD; Kimberly Kenton, MD, MS; C. Email Bretschneider, MD; Trends in operative time and outcomes in minimally invasive hysterectomy from 2008 to 2018; American Journal of Obstetrics & Gynecology 202.e2 FEBRUARY 2021. DOI.org/10.1016/j.ajog.2020.08.014

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

10.-Katrien Nulens, MD, Jan Bosteels, MD, Ph.D., Carine De Rop, MD, and Jan Baekelandt, MD, Ph.D.- V-NOTES Hysterectomy for Large Uteri: A Retrospective Cohort Study of 114 Patients. Journal of Minimally Invasive Gynecology. Vol 28, No 7, July 2021; DOI.org/10.1016/j.jmig.2020.10.003

Corresponding author: Carlos Leal MD Ph.D; Calle de La Llave #1419 suite 103 Colonia Centro, Chihuahua México CP 31000. E-mail: drcarlosleal@saludfemm.com
DOI: 10.36205/ trocar3.2022003
Received 08 2022 - Accepted 09-2022

THE INTERNATIONAL SOCIETY FOR GYNECOLOGIC ENDOSCOPY
PROMOTING VAGINAL SURGERY

the Trocar
Official Online Journal of ISGE

TheTrocar Issue 3 Volume 3 / Page 44 - 56 ISSN: 2736-5530

Congenital malformations of the female genital tract: a review of available classification systems

Authors: Patrícia Pereira Amaral[1,2], Paula Ambrósio[1], Raquel Condeço[1], Alexandra Coelho[1], Ana Bello[1] and Dusan Djokovic[1,3,4]

Affiliation:
[1] Maternidade Dr. Alfredo da Costa – Gynecological Ultrasound Unit, Centro Hospitalar Universitário Lisboa Central, Lisbon, Portugal
[2] Hospital Professor Doutor Fernando Fonseca, Lisbon, Portugal
[3] Department of Obstetrics and Gynecology, NOVA Medical School - Faculdade de Ciências Médicas, NOVA University of Lisbon, Lisbon, Portugal
[4] Department of Obstetrics and Gynecology, Hospital CUF Descobertas, Lisbon, Portugal

Abstract

Congenital malformations of the female genital tract are being diagnosed more frequently due to advances in imaging techniques. A broad international consensus on their classification is still lacking. This paper aimed to comparatively summarize the most frequently and widely used, as well as the most recently developed classification systems of congenital female genital malformations. A non-systematic review was done through a search on major databases with the medical subject heading (MeSH) term ‘‘congenital abnormalities” in combination with ‘‘classification” and ‘‘female genitalia”. All available systems, including, among others, the American Fertility Society Classification (1988), the Acien and Acien classification (1992, 2004),

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

the VCUAM system (2005), the European Society for Human Reproduction and Embryology - European Society for Gynecological Endoscopy classification (2013), the Congenital Uterine Malformation Experts (CUME) group recommendations, and the American Society for Reproductive Medicine Classification (2021) possess the advantages and disadvantages listed in this article. Regarding the most common situations, the criteria for differentiating physiologic arcuate and discrete partial septate uteri vary widely between classifications, while difficulties also persist with the rarer complex abnormalities that cannot be easily classified, contributing to a gap in clinical and research protocols. The main factor compromising any attempt to reach an ideal classification system is the lack of evidence-based data, justifying the need for comparative multicenter international randomized control trials in this field. Pending new research data and a broad international consensus, it seems essential for adequate patient orientation to describe each detected malformation in detail and to correlate it with the clinical presentation, regardless the type of classification used.

Key words: congenital abnormalities, classification, female genitalia, Diagnostic Techniques, Obstetrical and Gynecological, Gynecological Ultrasound and Imaging

Introduction:

Congenital malformations of the female genital tract consist on a heterogeneous group of deviations from normal anatomy (1, 2), which may result from the maldevelopment of the Mullerian or paramesonephric ducts during fetal life (3). Although considered rare in the past, with technological advancements and increasingly available diagnostic tools, these anomalies seem to be present in about 7% of the general population, with an even higher prevalence in the infertile population (4). Congenital malformations of the female genital tract often receive inappropriate, insufficient and/or late clinical attention, resulting in persistent symptomatology such as chronic pelvic pain or impaired reproductive function (5, 6).

Since the 1800s, there have been attempts to classify the female congenital anomalies; however, the first classifications were lacking organization and clarity (7). In 1979, Buttram and Gibbons developed a classification

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

system based on their analysis of 144 cases, dividing the anomalies in five different groups in accordance with the degree of failure of normal uterine anatomical development, clinical presentation and related pregnancy outcomes (8). In 1988, the American Fertility Society (AFS) published the first widely used classification system. Since then, many other classifications have been proposed, some of them quite broadly, but no one universally accepted.

The ideal classification system should be: (a) clear and precise in respect with the definitions and terms used; (b) accurate for diagnosis and differential diagnosis; (c) schematic and visually user-friendly to help classify the malformation in daily clinical practice; (d) comprehensive, incorporating all possible anatomical variations; (e) well correlated with the clinical presentation, treatment and prognosis of the patients; (f) based on scientific evidence and validated and (g) as simple as possible (2). Such a system does not exist. Each classification for congenital malformations of the female genital tract presents some advantages and disadvantages in comparison with other available classification systems.

This paper aims to comparatively summarize the most frequently and widely used, as well as the most recently developed classifications of congenital female genital malformations.

Material Method:

A non-systematic review was done through a search on the following databases: MEDLINE, Global Health, EMBASE, The Cochrane Library, Web of Science and Health Technology Assessment Database. The medical subject heading (MeSH) term ‘‘congenital abnormalities” (MeSH Unique ID: D000013) in combination with ‘‘classification” (MeSH Unique ID D002965) and ‘‘female genitalia” (MeSH Unique ID D005836) was used. The papers written in English language were selected from inception of the above-mentioned databases until August 1st, 2022. Titles and/or abstracts of studies retrieved using the search strategy were screened independently by two authors (P.P.A. and D.D.) to identify studies that could potentially meet the aims of this project. Potentially eligible articles (full texts) were retrieved and independently assessed for eligibility by the authors (P.P.A. and D.D. in the first phase; P.A., R.C. and A.B. in the

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

second phase), who subsequently extracted data from pertinent articles. Due to the nature of the findings, the working group (all authors) opted for a narrative synthesis of the extracted information from currently available literature.

Results of the review:

The American Fertility Society (AFS) Classification

In 1988, the American Fertility Society (AFS), later renamed to the American Society for Reproductive medicine (ASRM), proposed a revision of the Buttram and Gibbons classification. This system became the most universally used classification system (7), containing seven basic groups. The classification is based on the degree of impaired Mullerian development and its interference with the fertility (9).

In this system (Table 1.), the anomalies are classified according to the major uterine pathoanatomic types. Vaginal, tubal and cervix anomalies are considered additional findings (10). This system is simple, user-friendly and clear (2). However, there are three most relevant disadvantages of this classification: (I) it is focused primarily on uterine anomalies (7), leaving vaginal, tubal and cervix malformations topic addressed inappropriately; (II) some congenital anomalies are not included, specially complex malformations; (III) the system lacks clear diagnostic criteria, relying on pictures depicting the anomalies without clear descriptive definitions of the female genital tract malformations (7).

Table 1. AFS Classification system

Class	Denomination	Subclasses
I	Hypoplasia and agenesis	a) vaginal, b) cervical, c) fundal, d) tubal
II	Unicornuate uterus	a) communicating, b) noncommunicating, c) no cavity, d) no horn
III	Didelphys uterus	
IV	Bicornuate uterus	a) partial, b) complete
V	Septate uterus	a) partial, b) complete
VI	Arcuate uterus	
VII	Diethylstilbestrol (DES) induced malformations	

Notes: Consult the images at https://www.researchgate.net/figure/American-fertility-society-classification-of-uterine-anomalies_fig1_320078833.

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

Acién and Acién Classification

Acién and Acién proposed a classification of congenital female genital malformations in 1992 based on embryological and clinical features, and updated this system in 2004 and 2011 (1) (10). This classification takes into consideration embryological principles such as the fact that the mesonephric ducts and gubernaculum play a role in the adequate development of the mullerian ducts, helping in the distinction between groups and permitting also the classification of the anomalies beyond the uterine congenital malformations. The anomalies are divided into six groups. Although a classification system based not only on impaired anatomy but also on embryology seemed to be advantageous, most of the therapeutic options tend to restore the normal anatomy; thus, this classification has not been found particularly useful in clinical practice (2).

VCUAM Classification

Oppelt and collaborators came up with a new classification system in 2005 called Vagina, Cervix, Uterus, Adnexa and Associated malformations (VCUAM) (11). In this anatomical classification system, each organ is classified separately and it share some similarities with the tumor, node and metastasis (TNM) system for malignancies (11). This system´s main advantage is that it takes into account other commonly associated malformations (renal, skeletal, cardiac and neurological). It was initially validated in 99 patients (11). This system has never been widely accepted since it is not user-friendly. The anomaly is translated in a complicated succession of letters and numbers (for example, "V5b, C2b, U4b, A0, MR" corresponding to the Mayer-Rotitansky-Kuster-Hauser Syndrome)(2). Complete VCUAM classification can be consulted at https://www.fertstert.org/action/showPdf?pii=S0015-0282%2805%2902786-X.

The European Society of Human Reproduction and Embryology - European Society for Gynaecological Endoscopy (ESHRE-ESGE) Classification

In 2013, the ESHRE-ESGE, using a structured DELPHI procedure, published a classification system for Mullerian anomalies (12). This classification divides the anomalies into six classes based on anatomical and embryological principles. Sub-classes are based on anatomical variations of the main

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

classes expressing different degrees of uterine deformity and being clinically significant. Cervical and vaginal anomalies are classified in independent supplementary sub-classes. The anomalies are described with numbers and letters (12).

ESHRE/ESGE has attempted to define uterine anomalies based on 3D ultrasound measurements of uterine wall thickness and external and internal fundal indentations, instead of using absolute numbers (e.g., indentation of 5mm) as the uterine wall thickness could normally vary from one patient to another (12). The defined uterine anomalies have not been correlated with reproductive outcomes (13). The arcuate uterus was considered normal, which may have an impact on management decision (5). According to the Congenital Uterine Malformation by experts of the CUME group, these cut-offs overestimate the prevalence of the septate uterus (14).

Although this system is an improvement of the pre-existing ones, being based on modern imaging methods (such as 3D ultrasound, histerosonosalpingograpy and hysteroscopy)(15), there are two main concerns: (I) there is no correlation between imaging findings and symptoms, treatment and obstetrical outcome; (II) it has not be externally validated. Complete classification can be consulted at https://pubmed.ncbi.nlm.nih.gov/23894234/.

In 2014, Ludwin and collaborators made a prospective study with a selected population to compare ESHRE-ESGE and AFS classifications. In this work, they came to the conclusion that ESHRE-ESGE classification was associated with an increase (almost 300%) in the frequency of septate uterus recognition. Most diagnoses of septate uterus according to the ESHRE–ESGE system corresponded to arcuate or normal uterus diagnosed by AFS, although the overall distinction between congenital uterine malformation and normal anatomy by both systems showed good agreement (16).

In 2016, the CONUTA CONgenital UTerine Anomalies Working Group (CONUTA), established during the ESHRE Campus Workshop on Female Genital Anomalies in Thessaloniki, reviewed the criteria proposed in 2013 and updated them, namely the definition of septate uterus (15), as presented in Table 2.

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

Table 2. Diagnostic criteria for septate and normal/arcuate uterus as described by various classification systems.

Guideline	Diagnostic Criteria for septate uterus	Diagnostic criteria for normal/arcuate uterus
AFS (1988)	Subjective impression and clinical relevance	Subjective impression and clinically relevance (a benign, intermediate form of anomaly between a septate and a normally developed uterus)
VCUAM (2005)	Grade 1b - septate ≤ 50% of the uterine cavity Grade 1c - septate ≥ 50% of the uterine cavity	Grade 1a - arcuate
ESHRE-ESGE (2016)	Indentation-to-wall thickness ratio > 50%	Indentation-to-wall thickness ratio < 50%
CUME (2018)	Septal angle < 140 degrees, septal depth ≥ 10 mm or indentation-to-wall thickness ratio > 110% (preferred, as the simplest and most reliable criterium)	Septal angle < 140 degrees, septal depth < 10 mm or indentation-to-wall thickness ratio ≤ 110% (preferred, as the simplest and most reliable criterium)
ASRM (2021)	Septal angle < 90 degrees and septal depth > 15 mm	Septal angle > 90 degrees and septal length < 10 mm

The American Society for Reproductive medicine (ASRM) Classification

The most recently published is the American Society for Reproductive (ASRM) Mullerian anomalies classification. This is based on AFS classification and divides the anomalies into nine categories, which one divided into five educational elements (variants, similar to, presentation, imaging and treatment) (17).

This classification has advantages to the previous ones because: (I) it is simple to use (relies on pictures); (II) has an interactive electronic format for educational proposes (link); (III) its categories are identified by descriptive terminology instead of codes with letters and numbers; (IV) it takes into account uterine, vaginal and cervical anomalies; (V) this classification recognizes the Mullerian anomalies as a continuum of the variation in the embryological development. Although this can be considered as a "true 21st century" classification with multiple online and interactive resources that even propose treatment, there are some critiques to be noted. Although this classification is presented as a simple, flexible and structured approach, some of the

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

classification definitions are based on opinion of experts, rather than supported by scientific evidence (18). Also, there is a reported underestimation of the prevalence in the diagnosis of septate uterus, according to the Congenital Uterine Malformation Experts (CUME) group (14).

Most common malformations and diagnostic criteria discrepancies between classification systems

Septate uterus represents 55% of all Mullerian malformations and results from the lack of reabsorption of the median septum after the fusion of the müllerian structures. It can be classified as complete or partial depending on the moment when the failure occurs and has a deep impact in reproductive outcomes (19). On the other hand, arcuate uterus is considered a variant of the normal resulting from the failure in the final stage of reabsorption of the intermüllerian septum, with no clinical translation (9). Difficulties in differentiating between a normal/arcuate (Figure 1) and a septate uterus (Figure 2), inconsistent definitions and varying indications for surgery are associated with an increased likelihood of unnecessary iatrogenic treatment (14). The distinction criteria between normal/arcuate and septate uterus according to the most relevant classification systems are presented in Table 2. Even for the most frequent Müllerian anomalies, our literature search revealed that there is no international consensus on the criteria to be used. Moreover, while frequent non-extreme clinical situations are classified as pathological according to some systems, others consider them normal.

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

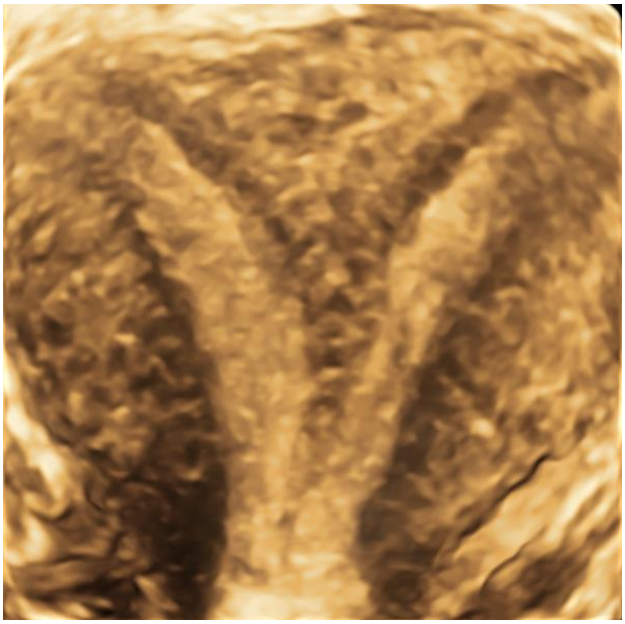


Figure 1. 3D ultrasound image of a normal/arcuate uterus with a cesarian scar niche.

Figure 2. 3D ultrasound image of a septate uterus.

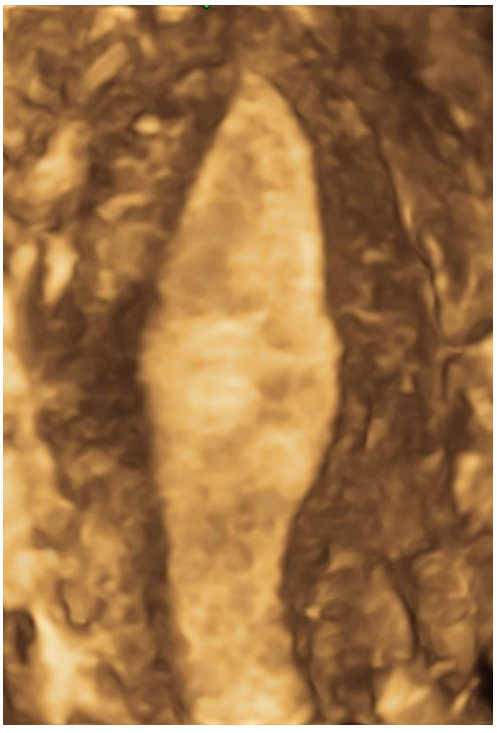


Figure 3. 3D ultrasound image of T shaped uterus.

Figure 4. 3D ultrasound image of an unicornuate uterus.

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

Discussion:

Most of the criteria used in the diagnosis of Müllerian anomalies are based on anatomical, clinical and imaging data. Although physical examination is essential to detect vaginal and cervical anomalies, it should not be used for the diagnosis of uterine anomalies without complementary imaging studies due to lack of accuracy (15). In the past, laparoscopy and hysteroscopy were considered the gold standard for the diagnosis of these conditions. The surgical approaches are currently considered second-line because (I) they are (although minimally) invasive, (II) the diagnosis is mainly based on the subjective impression of the clinician(s) performing the procedures and (III) they evaluate primarily the uterine fundus (laparoscopy) and cavity (hysteroscopy) (20), providing no information on the uterine wall (15).

With technological progress, 3D ultrasound and MRI are now considered preferred tools to diagnose these anomalies. Although ultrasound is widely available, contrast-enhanced 3D sonography is currently recognized as the gold standard diagnostic technique. The 3D ultrasound is less operator-dependent than 2D ultrasound, having a better correlation with MRI (20), and providing high-quality spatial information on external contour, myometrium and uterine cavity (21). Hysterosalpingo-contrast-sonography is a non-invasive, cost-effective method that has high accuracy in identifying uterine anomalies (22). It is recommended to be performed during the early follicular phase to avoid pregnancy and artifacts. However, the distension of the uterine cavity could potentially modify the internal uterine contour resulting in false negative imaging of the uterine cavity (15). With increased usage of non/less invasive imaging techniques, the number of diagnosed cases have been increasing, including complex malformations which may not fit into any of the existing classifications.

Over the years, attempts have been made to classify all anomalies of the female reproductive system, initially from a purely anatomical point of view, later encompassing principles of embryology (5). As presented above, even in the most frequent situations, such as arcuate and septate uterus, there is still no consensus. The frequency and prevalence of these situations vary between studies depending

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

on the applied criteria. On the other hand, complex abnormalities cannot be easily classified using any current classification system, contributing to a gap in clinical and research protocols. In our opinion, the major factor compromising the attempts to reach an ideal classification system is the lack of evidence-based data. Comparative multicenter international randomized control trials, including those focused on treatment outcomes and overall impact on women's reproductive health, are greatly needed. In addition, it may be useful to group the patients who would benefit from the same treatment (medical and/or surgical), even with different anomalies, and evaluate the outcomes of offered management strategies.

Despite the challenges, it is crucial that international groups keep trying to standardize diagnostic criteria, allowing the development of therapeutic guidelines for multidisciplinary teams directly involved in the management of these patients including gynecologists, imaging specialists, pediatricians, general surgeons, urologists, among others. Meanwhile, when observing the patients, it´s of most importance to describe each detected malformation in detail, objectively, and to correlate it with the clinical presentation, regardless of how it will be classified by different systems. After a detailed description, it is adequate to classify the situation with the aid of two or more systems in parallel, if there is a discrepancy between the classifications, while the decision to implement a specific treatment should l be guided primarily, if not exclusively, by clinical relevance, i.e., clinical manifestations of the malformation.

Conclusion:

Congenital malformations of the female reproductive system are increasingly diagnosed due to technological advances and the availability of imaging techniques, having a great impact on the well-being of women and couples, primarily due to their interference with the reproductive outcomes. Contrast-enhanced 3D sonography is the gold standard in diagnostics. Despite being many, there is no single ideal and universally accepted classification. A detailed and adequate description along with the correlation of the observed malformation with the associated symptoms are fundamental in the decision for the best treatment strategy. It is

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

necessary to sustain international efforts and to conduct high-quality studies that offer evidence-based data in order to improve the classification and applicability of classification systems of congenital malformations of the female reproductive tract.

References:

1.Acién P, Acién M, Sánchez-Ferrer M. Complex malformations of the female genital tract. New types and revision of classification. Human Reproduction. 2004;19(10):2377-84.

2.Grimbizis GF, Campo R. Congenital malformations of the female genital tract: the need for a new classification system. Fertility and sterility. 2010;94(2):401-7.

3.Cunha GR, Robboy SJ, Kurita T, Isaacson D, Shen J, Cao M, et al. Development of the human female reproductive tract. Differentiation. 2018;103:46-65.

4.Saravelos SH, Cocksedge KA, Li T-C. Prevalence and diagnosis of congenital uterine anomalies in women with reproductive failure: a critical appraisal. Human reproduction update. 2008;14(5):415-29.

5.Maribel Acién PA. Classification of Mullerian anomalies: Is a consensus possible? Case Reports in Women´s Health. 2022;34(e00413).

6.Hassan M-AM, Lavery SA, Trew GH. Congenital uterine anomalies and their impact on fertility. Women's Health. 2010;6(3):443-61.

7.Kives S. Müllerian Anomaly Classification Systems. Springer International Publishing Switzerland. 2016:3-12.

8.Buttram Jr VC, Gibbons WE. Müllerian anomalies: a proposed classification (an analysis of 144 cases). Fertility and sterility. 1979;32(1):40-6.

9.Adhesions A. The American Fertility Society classifications of adnexal adhesions, distal tubal occlusion, tubal occlusion secondary to tubal ligation, tubal pregnancies, Mullerian anomalies and intrauterine adhesions. Fertil Steril. 1988;49(6):944.

10.Acién P, Acién MI. The history of female genital tract malformation classifications and proposal of an updated system. Human reproduction update. 2011;17(5):693-705.

11.Oppelt P, Renner SP, Brucker S, Strissel PL, Strick R, Oppelt PG, et al. The VCUAM (Vagina Cervix Uterus Adnex–associated Malformation) Classification: a new classification for genital malformations. Fertility and sterility. 2005;84(5):1493-7.

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

12.Grimbizis GF, Gordts S, Di Spiezio Sardo A, Brucker S, De Angelis C, Gergolet M, et al. The ESHRE/ESGE consensus on the classification of female genital tract congenital anomalies. Human Reproduction. 2013;28(8):2032-44.

13.Jayaprakasan K, Ojha K. Diagnosis of Congenital Uterine Abnormalities: Practical Considerations. Journal of Clinical Medicine. 2022;11(5):1251.

14.Ludwin A, Martins WP, Nastri CO, Ludwin I, Coelho Neto MA, Leitão VM, et al. Congenital Uterine Malformation by Experts (CUME): better criteria for distinguishing between normal/arcuate and septate uterus? Ultrasound in Obstetrics & Gynecology. 2018;51(1):101-9.

15.Grimbizis GF, Di Spiezio Sardo A, Saravelos SH, Gordts S, Exacoustos C, Van Schoubroeck D, et al. The Thessaloniki ESHRE/ESGE consensus on diagnosis of female genital anomalies. Human Reproduction. 2016;31(1):2-7.

16.Ludwin A, Ludwin I. Comparison of the ESHRE–ESGE and ASRM classifications of Müllerian duct anomalies in everyday practice. Human Reproduction. 2015;30(3):569-80.

17.Pfeifer SM, Attaran M, Goldstein J, Lindheim SR, Petrozza JC, Rackow BW, et al. ASRM müllerian anomalies classification 2021. Fertil Steril. 2021;116(5):1238-52.

18.Ludwin A, Tudorache S, Martins WP. ASRM Mullerian Anomalies Classification 2021: a critical review. Ultrasound Obstet Gynecol. 2022;60(1):7-21.

19.de Mattos Pinto e Passos ILB, Renata Diagnosis and treatment of mullerian malformations. Taiwanese Journal of Obstetrics and Gynecology. 2020;59(2):183-8.

20.Bermejo C, Martínez Ten P, Cantarero R, Diaz D, Pérez Pedregosa J, Barrón E, et al. Three-dimensional ultrasound in the diagnosis of Müllerian duct anomalies and concordance with magnetic resonance imaging. Ultrasound in Obstetrics & Gynecology. 2010;35(5):593-601.

21.Graupera B, Pascual MÀ, Hereter L, Pedrero C. Role of 3D Ultrasound in the Evaluation of Uterine Anomalies. In: Tinelli A, Alonso Pacheco L, Haimovich S, editors. Hysteroscopy. Cham: Springer International Publishing; 2018. p. 69-82.

22.Ludwin A, Ludwin I, Banas T, Knafel A, Miedzyblocki M, Basta A. Diagnostic accuracy of sonohysterography, hysterosalpingography and diagnostic hysteroscopy in diagnosis of arcuate, septate and bicornuate uterus. Journal of Obstetrics and Gynaecology Research. 2011;37(3):178-86.

Corresponding author: Patrícia Pereira Amaral
DOI: 10.36205/ trocar3.2022004
Received 07 - 2022 Accepted 9 - 2022

THE INTERNATIONAL SOCIETY FOR GYNECOLOGIC ENDOSCOPY
PROMOTING VAGINAL SURGERY

TheTrocar
Official Online Journal of ISGE

TheTrocar Issue 3 Volume 3 / Page 57-70 ISSN: 2736-5530

Office hysteroscopy: findings in patients attending a clinic in Kinshasa, the Democratic Republic of Congo

Author: Nzau-Ngoma E[1,2], Kusuman A[1], Odimba MJ[1], Mboloko EJ[1]

Affiliation: [1] Department of Obstetrics and Gynecology, University Hospital of Kinshasa, Kinshasa, Democratic Republic of Congo

[2] Clinique d'Or, Kinshasa, Democratic Republic of Congo

Abstract

Hysteroscopy is not yet widely used in developing countries leading to incorrect diagnosis and no proper treatment in some conditions. Office hysteroscopy favors the lowering of the global cost, and this is very interesting to boost its practice in developing countries, as for the same symptom, uterine findings can vary widely from a setting to another. The aim of the study was to describe the epidemiologic profile and hysteroscopic findings in patients who underwent an office hysteroscopy.

Methodology: A cross-sectional study was conducted on medical records of 1022 patients who underwent an office hysteroscopy at Clinic d'Or in Kinshasa, DR Congo from March 2018 to August 2022.

General characteristics of patients, indications of hysteroscopy, characteristics of the procedure and hysteroscopic diagnosis were analyzed. All hysteroscopies were practiced using a 5 mm total diameter Bettocchi Hysteroscope, with 5 FR operating channel and 2.9 mm, 30-degree scope in an office setting. Pain was evaluated using a simple numeric pain scale. Data were analyzed using SPSS 21.0 and descriptive statistics were computed. The test was statistically significant for a p value < 0.05.

Results: Patients' age was 37.5 ± 7.6 years. Seventy-four percent of patients had university level and 79.4% of them were married. Sixty-two percent (61.7%) had at least either one abortion or one miscarriage. The infertility workup was the main indication of hysteroscopy (54.8%) followed by abnormal uterine bleeding (20.3%). The vaginoscopic approach was used almost in all cases (99.7%), and a half (51.8%) did not have pain. Fibroids, endometrial polyps and uterine adhesions were the most common conditions with respectively 15.7 %, 14.5 % and 14.3 %. Patients with history of abortion/miscarriage had more cervical

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

stenosis and more intrauterine adhesions than others (p=0.000). Adhesiolysis for intrauterine adhesions (97.6% of all adhesions) and polypectomies (98.8% of all polyps) were performed.

Conclusion: Office hysteroscopy is performed mostly in patients who are at their thirtieth, with university level, non-menopausal and married. The main indications are infertility and abnormal uterine bleeding. A great number of the most common findings can be treated in the office setting in a "see and treat" approach. This could help in developing the practice of hysteroscopy in low resource settings.

Key-words: office hysteroscopy, vaginoscopy, see and treat, hysteroscopy findings

Introduction

Hysteroscopy is a modern procedure that is not yet widely used in the developing world. Being an endoscopic technology, the limitation due to investment cost, training, and low access of patients because of the cost of the procedure, hampers its spread in low-income areas.

For decades, hysteroscopy has been qualified as a procedure "seeking indications", but nowadays, it is being considered by many authors as a first line procedure in exploring and treating intrauterine pathologies (1, 2). This has been made possible by the development of instrumentation, energy sources and distension medium (3). Being practiced for many years exclusively in operating rooms (4), thanks to the development of instrumentation and experience of practitioners, the procedure has been brought to office setting without analgesia, without anesthesia, improving then its implementation. In fact, it is widely practiced in a routine basis mostly in developed countries and some Asian countries. In Romania, Stefanescu et al. (5) performed 3220 procedures, all indications, in one facility within a period of three years and half. Capmas et al (6), in France, reported 2402 diagnostic hysteroscopies within a period of four years. This routine practice facilitated the production in the literature of many studies addressing various aspects of hysteroscopy.

Despite the trend of developing the practice of hysteroscopy, the situation in many developing countries and particularly in Sub Saharan Africa has not substantially evolved. This fact induces an inaccurate evaluation of intrauterine conditions in these countries, leading to overtreatment in some cases or undertreatment in other cases. Otherwise, hysteroscopy being the gold standard in evaluating the uterine cavity pathologies, it should be the tool to guide their management.

It has been shown that hysteroscopic findings according to some complaints vary widely from an area to another depending on epidemiology of considered pathologies. These variations were reported by many authors. Ajayi et al. (7), comparing hysteroscopic findings between Nigerian and Indian infertile women, noted the predominance of submucous fibroid and intrauterine adhesions in Nigerian whereas there were more polyps and uterine septa in Indian. In Kenya, Parkar et al. (8), in a study on 463 hysteroscopies performed for all indications, reported that submucous fibroid and endometrial polyps were the predominant findings.

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

In the Democratic Republic of Congo, no study has been yet conducted on hysteroscopy. Results from such study will help to guide the management of intrauterine conditions based on local data. The objectives of the present study were to describe sociodemographic and clinical characteristics of patients, the hysteroscopic particularities and findings and to analyze association between patients' characteristics and hysteroscopic findings.

Methods

We conducted a cross-sectional study collecting data of patients who underwent office hysteroscopy between March 2018 and August 2022 in "clinic d'Or"; a private clinic in Kinshasa, the Democratic Republic of Congo (DRC). Patients were coming from internal practice in the Clinic but also some were referred from colleagues in the City. In a routine basis, before each procedure, the history of patient is taken and is recorded on an appropriate sheet that is then referred to when elaborating the final report. Information on the procedure is provided to each patient and a written consent is signed. A nurse accompanies the patient during the exam and keeps her discussing as often as possible. Neither analgesia nor anesthesia is offered in a systematic approach and there is no use of prostaglandins for facilitating cervical navigation by the hysteroscope.

General characteristics of patients, indications of hysteroscopy, characteristics of the procedure and hysteroscopic diagnosis were analyzed. All hysteroscopies were practiced by two experienced practitioners using a 5 mm total diameter Bettocchi Hysteroscope, with 5 FR operating channel and 2.9 mm, 30-degree scope in an office setting. In few cases, the traditional approach was applied using a vaginal speculum and a Pozzi tenaculum allowing the insertion of the hysteroscope directly into the cervical canal. In the vaginoscopic approach, the hysteroscope is inserted into the lower vagina and under hydro-distension with the distension medium, the navigation begins at that point to reach the external cervical os. Once in the cervical canal, the navigation continues to allow for passage into the cervical canal and uterine cavity through gentle movements (9).

Pain was evaluated using a simple numeric scale (SNS). Patients were asked to evaluate pain using a scale from 0 to 10; 0 representing the absence of pain and 10 the most severe one. We established a score and categorized patients in groups: No pain (0), Mild pain (1 – 3), Moderate pain (4 – 6) and severe pain (7-10). Five patients were offered general anesthesia on their demand as they didn't want to be lucid during the procedure. Gravidity was grouped in Nulligravida (no prior pregnant) paucigravida (1 to 3 pregnancies) and multigravida (from 4 pregnancies). Parity groups were: Nulliparous (no delivery yet), pauciparous (1 to 3 deliveries), multiparous (from 4 to 5 deliveries) and great multiparous (from 6 deliveries).

Data were analyzed using SPSS 21.0 and descriptive statistics were computed. Comparison of proportions between groups was achieved using Pearson Chi square test. The test was statistically significant for a p value < 0.05.

Results

Overall, 1024 procedures in an office setting were practiced from March 2018 to August 2022. Two patients were excluded because of the uncompletion of the procedure (table 2) due to a highly fibrotic cervix, necessitating dilatation. Patients who experienced vasovagal reaction did

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

undergo the procedure and were then included in the study.

Patients' characteristics

Patients' age was 37.5 ± 7.6 years and 94.7% had from 18 to 49 years. Seventy-four percent of patients had university level and 79.4% of them were married. Regarding their history, 27.6% of patients were nulligravida with median gravidity of 2 and extremes from 0 to 11. Patients were nulliparous in 60.7% of cases with a median parity of 0 and extremes from 0 to 8. Sixty-two percent (61.7%) had at least either one abortion or one miscarriage with a median of 1 and extremes from 0 to 9 and 4.7% were menopausal (table 1).

Variable	Frequency	Percentage	Means	SD	Median	Extremes
Age (year)						
18 – 34	353	34.5				
35 – 49	615	60.2	37.5	7.6		
At least 50	54	5.3				
Education level						
Primary	38	3.7				
Secondary	229	22.4				
University	755	73.9				
Marital status						
Maried	811	79.4				
Unmarried	191	18.7				
Divorced	12	1.2				
Widow	8	.8				
Gravidity						
Nulligravida	282	27.6				
Paucigravida	519	50.8			2	0 – 11
Multigravida	221	21.6				
Parity						
Nulliparous	620	60.7				
Pauciparous	336	32.9			0	0 – 8
Multiparous	55	5.4				
Great multiparous	11	1.1				
Abortion/miscarriage						
No	391	38.3				
1 – 3	549	53.7			1	0 – 9
At least 4	82	8.0				
Menopausal status						
Yes	48	4.7				
No	974	95.3				
Total	**1022**	**100.0**				

Table 1. Patients' characteristics

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

Procedure description

Hysteroscopy was performed for infertility in 54.8%, for abnormal uterine bleeding in 20.3% and as a postoperative uterine cavity control procedure in 7.6 % of cases (figure 1). Considering the procedure characteristics, almost all hysteroscopies (99.7%) were performed using a vaginoscopic approach (without speculum, without tenaculum), 98.7% were conducted without anesthesia and less than 1 % (0.5 %) of patients benefited from general anesthesia because they didn't want to be lucid during the procedure. Patients reported no pain in 51.8 % and mild pain in 44.2 %. The median pain score was 0 with extremes from 0 to 8 according to simple numeric scale. The median duration of the procedure was 6.7 minutes varying from 2 to 45 minutes and 83.1 % of procedures varied from 2 to 9 minutes (table 2).

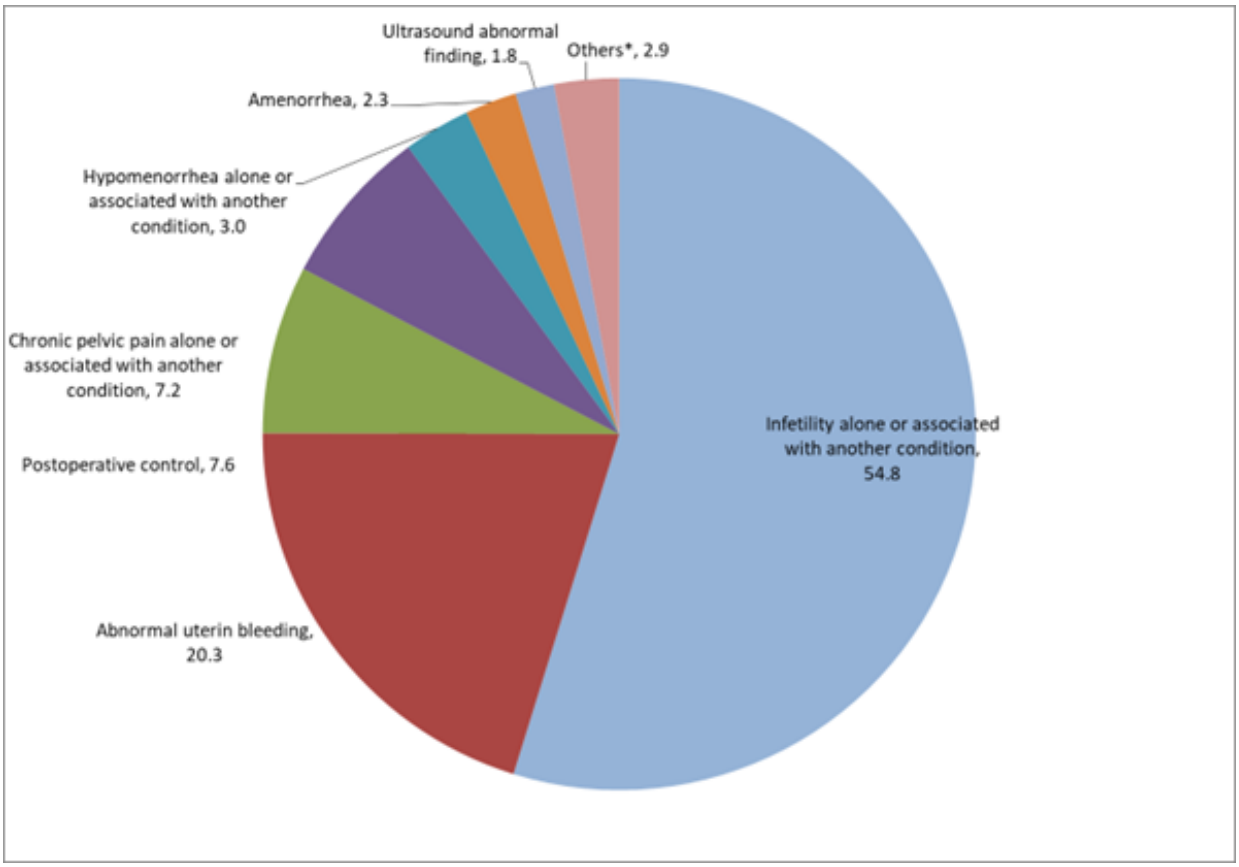


Figure 1: Proportions in percent of hysteroscopy indications in percent (n=1122)

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

Variables	Frequency	Percentage	Median	Extremes
Process completion (n=1024)				
Yes	1022	99.6		
No	2	0.4		
Hysteroscopic approach (n=1022)				
Vaginoscopic	1019	99.7		
With speculum	3	0.3		
Anesthesia (n=1022)				
Without anesthesia	1009	98.7		
General anesthesia	5	0.5		
Paracervical bloc	8	0.8		
Pain according to Simple Numeric Scale (n=1022)				
Non pain	527	51.8		
Mild pain	450	44.2	**0**	**0 – 8**
Moderate pain	38	3.7		
Severe pain	2	0.2		
Procedure duration in minute (n=532)				
2 à 6	331	62.2		
7 à 9	111	20.9	6.7	2 – 45
Au moins 10	90	16.9		
Complications (n=1022)				
During the procedure				
No complication	1015	99.5		
Uterine perforation	3	0.3		
Vasovagal reaction	2	0.2		
After the procedure				
No complication	1020	99.8		
Persistent bleeding after procedure	2	0.2		

Table 2. Characteristics of hysteroscopy procedure

In all, complications were noted in seven patients (0,7%). Five patients had complications during the procedure, and this has been dominated by uterine perforation (0.3%) which occurred during adhaesiolysis.

The hysteroscopy showed a pathology in 84.3% and the five main hysteroscopic findings were submucous fibroids (15.7%), intrauterine adhesions (14.5%), endometrial polyps (14.3%), cervical stenosis (10.3%) and adenomyosis (9.1%) (figure 2 and 3).

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

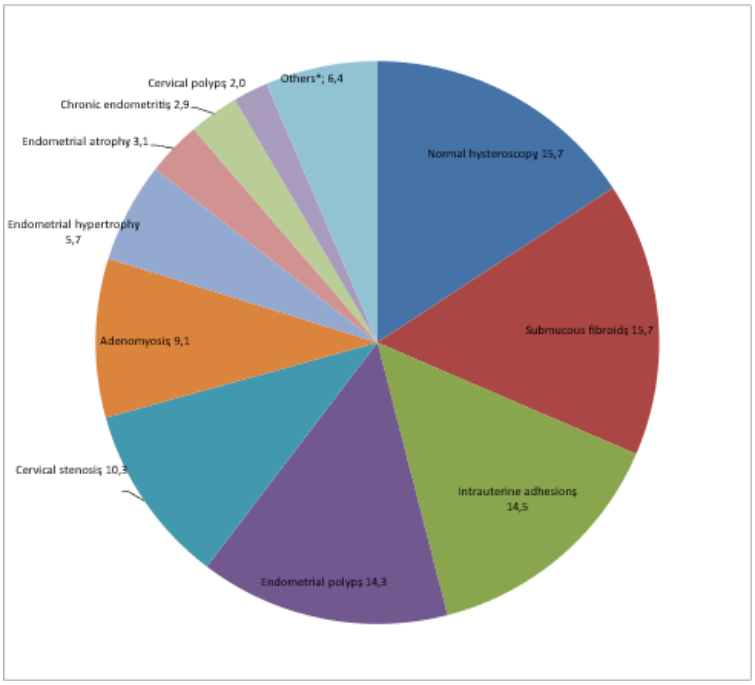


Figure 2: Proportions in percent of hysteroscopic findings in percent (n=1150)

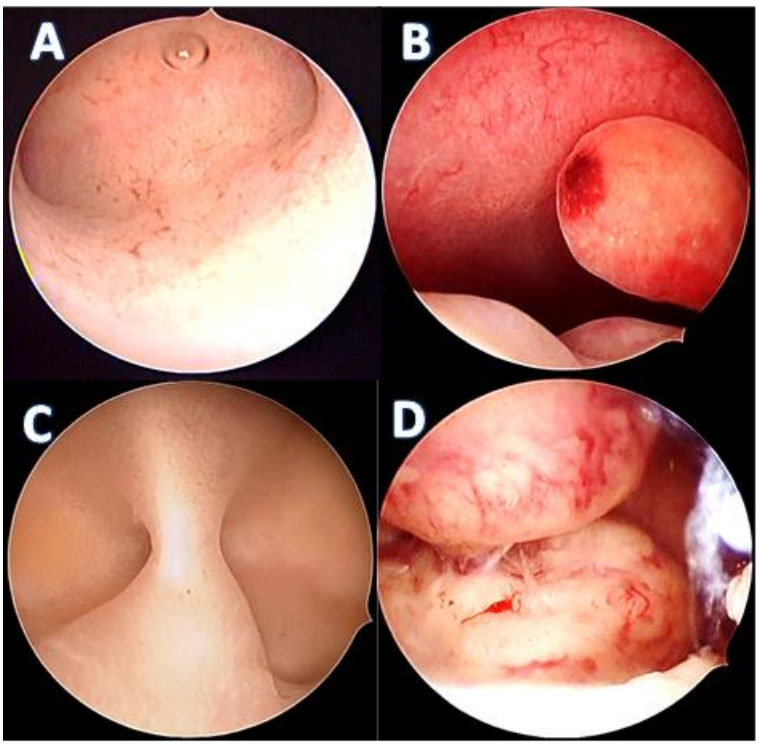


Figure 3: Some images of hysteroscopic findings. A: normal uterine cavity, B: endometrial polyps, C: intrauterine adhesions, D: submucous fibroids.

Operative procedures during office hysteroscopy

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

During this period, 29 myomectomies (16%), 161 polypectomies (97.9%) and 165 intrauterine adhesiolyses (98.8%) were performed (table 4) in a "see and treat" approach. These operative procedures were conducted using mechanical instruments (hysteroscopic 5 FR scissors and/or biopsy/grasper forceps) (table 4).

Associations between variables

Patients with history of abortion/miscarriage had more cervical stenosis (14.7%) and more intrauterine adhesions (20.8%) compared to those without this history (6.9% for cervical stenosis and 8.7% for intrauterine adhesions) (p = 0.000 for both) (table 3). Among patients with cervical stenosis, 71.4% experienced pain compared to 45.1% in the group without cervical stenosis and the difference between the two groups was statistically significant (p = 0.000). This study showed that patients with abortion/miscarriage history had more pain (50%) than others (45.2%) but it failed to establish a statistically significant difference (p=0.140).

Comparing patients with abnormal uterine bleeding to those without this complaint, the difference was statistically significant when taking in consideration the finding of submucous fibroid and/or endometrial polyp with respectively 56.5% and 25.3%. Hysteroscopic diagnosis didn't differ in terms of abnormal findings when comparing patients with and without infertility.

Variable	**Variable**		**Total (n=1022)**	p
	Cervical stenosis			
Abortion/miscarriage	**Yes**	**No**		
Yes	93 (14.7%)	538 (85.3%)	631 (100.0%)	0.000
No	27 (6.9%)	364 (93.1%)	391 (100.0%)	
	Pain			
Abortion/miscarriage	**Yes**	**No**		
Yes	314 (50.0%)	314 (50.0%)	628 (100.0%)	0.140
No	176 (45.2%)	213 (54.8%)	389 (100.0%)	
Cervical stenosis				
Yes	85 (71.4%)	34 (18.6)	119 (100.0%)	0.000
No	405 (45.1%)	493 (54.9)	898 (100.0%)	
	Intrauterine adhesions			
Abortion/miscarriage	**Yes**	**No**		
Yes	131 (20.8%)	499 (79.2%)		0.000
No	34 (8.7%)	357 (91.3%)		
	Submucous fibroid and/or Endometrial polyp			
Abnormal uterine bleeding	**Yes**	**No**		
Yes	117 (56.5%)	90 (43.5%)	207 (100.0%)	0.000
No	206 (25.3%)	609 (74.7%)	815 (100.0%)	
	Abnormal hysteroscopic findings			
Infertility	**Yes**	**No**		
Yes	450 (80.5%)	109 (19.5%)	559 (100.0%)	0.100
No	391 (84.4%)	72 (15.6%)	463 (100.0%)	

Table 3. Association between some variables

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

Conditions	Total cases	Cases operated	Percentage
Submucous fibroids	181	29	16.0
Endometrial polyps	165	161	97.6
Intrauterine adhesions	167	165	98.8
DIU extraction	10	10	100
Stenosis resection	119	119	100
Opening adenomyosis cysts with scissors (ademomysis with cysts)	27	7	25.7

Table 4. Operative procedures during office hysteroscopy

Discussion

Indications

In literature, clinical presentations in patients benefiting from hysteroscopy are dominated by abnormal uterine bleeding with frequencies varying between 45 and 86,5% (10, 11).

In this study, hysteroscopic evaluation of the uterine cavity as infertility workup constituted the main indication (54,8%), and the abnormal uterine bleeding represented less than a half (20.3%). This result is different from those reported above but in accordance with 49,2% noted by Tangri et al. (12) in India. The difference could be related to the selection of patients in many studies and to the fact that routine evaluation of the uterine cavity even in conventional management or in In Vitro Fertilization is not uncontroversial. In fact, in the absence of suggesting complaints, ultrasound features or IVF failures, a systematic hysteroscopic evaluation of uterine cavity is not cost-effective (13, 14). Obviously, the debate still needs to be raised in our area on the usefulness and cost-effectiveness of routine hysteroscopic evaluation of uterine cavity in infertile women.

Hysteroscopic procedure

Almost all hysteroscopies were managed using vaginoscopic approach (99.7%). This result is in accordance with Pluchino et al. (15) in Italy (2010) and Stefanescu et al. (5) in Romania (2012) reporting respectively 90 % and 78 % of vaginoscopic approach. It differs from the 30% of vaginoscopic approach shown by Cooper et al. (16) in Great Britain (2013). This approach has been widely recommended to allow more procedures in the office setting as it reduces the patient discomfort induced by the speculum and the tenaculum. But this is related to the experience of practitioners and the policy regarding health insurance. In fact, in some areas, practitioners prefer to perform hysteroscopy in the operating room, as traditionally, due to the lack of fiscal incentives for office procedures (17). However, it is obvious that vaginoscopy, not only simplifies the procedure, but lowers its cost and should be recommended particularly in low-income countries.

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

Pain during office hysteroscopy

Office hysteroscopy with vaginoscopic approach is well tolerated by patients as shown in the present study. In fact, 51.8% of patients had no pain and 44.2% reported to have experienced mild pain during the procedure. This is similar to the result published by Deffieux et al. (18) in France and also to the data in the literature.

The pain score did not display normal distribution because some operative procedures, producing more pain, were practiced. The median pain score was 0, varying from 0 to 8 out of 10. The experience of severe pain was less encountered compared to several studies in the literature. It was 0.2% in the present study, much lower than the 32.3% reported by de Freitas Fonseca et al. (19), the 20.4% by Bettochi et al. (20). and as reported by De Angelis et al. (21). This reality can reflect the disparity in relation to the perception of pain depending on the painful stimuli, the level of education, cultural factors, a previous bad experience in relation to pain and the circumstances of onset of pain (22). The question that should be asked is whether the patients in our setting are more resilient to pain than those studied in the above-mentioned publications. This question would raise a lot of speculation but deserves to be studied to adapt certain anesthesia protocol during hysteroscopy but also the caliber of the hysteroscope according to the characteristics of our populations in relation to pain.

The vagino-scopic approach, almost used in all cases but 3 in the present study, has been demonstrated to be associated with a statistically significance reduction in pain (9) and should be preferred in office setting. The knowledge of hysteroscopic anatomy (instrumentation and genital tract) is very crucial to allow a smooth navigation and avoid discomfort to patients (20).

Findings

Submucous fibroid was the main finding in hysteroscopy (15.7%) followed by intrauterine adhesions (14.5%), endometrial polyps (14.3%), cervical stenosis (10.3%) and adenomyosis (9.1%). Hysteroscopic findings vary from one study to another depending on the selection of patients and the epidemiology of pathologies in each area. In their study, Capmas et al. (6), noted submucous fibroid predominating, followed by endometrial polyps and intrauterine adhesions. Ajayi et al. (7) comparing infertile Nigerian to Indians patients, reported that intrauterine adhesions and submucous fibroid were the pronounced findings in Nigerians whereas in Indians, they noted that polyps and uterine malformations were dominating. In Kenia, Parkar et al. (8) found that submucous fibroid and endometrial polyps were the predominant pathologies.

In many studies and particularly in Africa, submucous fibroid, intrauterine adhesions and endometrial polyps are the main findings reported with different proportions. In sub-Saharan Africa, the racial disparity reported for fibroid; whose prevalence is 3 times higher in black women (23) and the prevalence of unsafe abortion could contribute to maintaining in top 2 or 3 the two main findings namely fibroid and intrauterine adhesions.

Adenomyosis had a significant proportion in the present study (9.1%). This should raise the question of its extent in our areas and its association with other forms of endometriosis. Cervical stenosis is another drawback of unsafe abortion and there was a statistically significant

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

association to abortion/miscarriage (p=0,000) in the present study.

Operative procedures

In our practice, we apply a "see and treat" approach and that allowed us, in the present series, to perform some operative procedures mostly adhaesiolysis for intrauterine adhesions (97.6% of all adhesions) and polypectomies (98.8% of all polyps). Endometrial biopsy has not been considered as being an operative procedure. Several studies in the literature showed the great possibility of performing various hysteroscopic procedures in an office setting (24, 25) which drastically reduces the cost and promotes the extension of the practice, especially in low-resource countries.

Association

Regarding the associated factors, patients with a history of abortion had more cervical stenosis, those with cervical stenosis had more pain and this was statistically significant. Since all cervical stenoses were either resected with scissors or dilated with the tip of the hysteroscope or the jaws of the grasping forceps, the pain could be linked to this act and also to the loss of cervical smoothness related to fibrosis causing then pain when rotating to explore from one tubal ostium to another. The practitioner in our settings should learn how to manage cervical stenosis given that this pathology is frequent, especially in patients with a history of abortion. However, the history of abortion was not statistically associated with pain during hysteroscopy, probably because of not having differentiated abortions with dilation and curettage or aspiration from those without this treatment.

This study did not analyze other risk factors of pain during office hysteroscopy such as diabetes, age, previous curettage, dyspareunia, dysmenorrhea, hysteroscopist experience, anxiety and patient waiting time before the procedure (19, 26) Further specific studies will have to integrate these factors and analyze them to provide important information for the management of pain during office hysteroscopy in our environment.

Although the main pathological findings at hysteroscopy were uterine fibroids, intrauterine adhesions and endometrial polyps, which can to some extent lead to delayed conception or infertility, infertile patients did not have more abnormal findings than the others. This result may be supported by the predominance in Sub-Saharan Africa of tubal and peritoneal causes of infertility rather than uterine anomalies (27, 28).

Study limitations

Although the present study is the first in the DRC to address hysteroscopy and its sample size is large, it does have some limitations. On abortions, a clarification should be given regarding the practice of curettage. Surgical history, particularly caesarean section and myomectomy could be associated with certain findings such as intrauterine adhesions. Being a study of patients' records, these details could not be retrieved mostly in patients coming from other colleagues. The analysis of factors associated with pain perception is another limitation that should be addressed in further studies.

Conclusion

Office hysteroscopy is a simple and acceptable procedure in experienced hands. It is very well tolerated even without analgesia or anaesthesia and the rate of complications is very low. This procedure is performed mostly in patients who

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

are at their thirtieth, with university level, non-menopausal and married. The main indications are infertility workup and abnormal uterine bleeding. The experience of pain is less marked in patients and the most associated factor is the presence of cervical stenosis. A great number of the most common findings can be treated in the office setting in a “see and treat” approach and this could help in developing the practice of hysteroscopy in low-income settings. Further studies are therefore awaited to address various specificities of hysteroscopy to improve its performance in our setting.

Disclosure of interest

The authors declare that they have no competing interest.

References

1. Gkrozou F, Dimakopoulos G., Vrekoussis T. et al. Hysteroscopy in women with abnormal uterine bleeding: a meta-analysis on four major endometrial pathologies. Arch Gynecol Obstet 2015; 291 : 1347–1354.

2. Kaskas M, Mergui JL, Yazbeck C et al. Office hysteroscopy for infertility : a series of 557 consecutive cases. Obstet Gynecol int 2010 ; 168096: 1 – 4.

3. Gimpleson R. Panoramic hysteroscopy with directed biopsies versus dilatation and curettage for accurate diagnosis. J Reprod Med 1984; 29: 575-578.

4. Hamou J, Microhysteroscopy. A new procedure and its original applications in gynecology. J Reprod Med. 1981; 26: 375 – 382.

5. Stefanescu A, Marinescu B, 2012 Diagnostic hysteroscopy a Retrospective study of 1545 cases. Maedica (Bucur) 2012; 7: 309-14.

6. Capmas P, Pourcelot AG, Giral E et al. Office hysteroscopy: A report of 2402 cases. J Gynecol et Biol Reprod 2016; 45: 445 – 50.

7. Ajayi VD, Ajayi AB, Ramesh B et al. Comparative Analysis of Hysteroscopic Findings among infertile Women in Nigeria and in India: a Preliminary Investigation. J Gynecol and Women’s Health 2017; 6: JGWH.MS.ID.555681

8. Parkar R.B, Thagana N.G. Hysteroscopy surgery at the AGA KHAN HOSPITAL NAIROBI. East African Medical Journal 2004; 81: 336 – 340.

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

9. De Silva PM, Carnegy A , Smith PP, Clark TJ. Vaginoscopy for office hysteroscopy: A systematic review & meta-analysis. European Journal of Obstetrics & Gynecology and Reproductive Biology 2020; 22: 278-285.

10. Garbin O, Kutnahorsky R, Göllner JL, et al. Vaginoscopic versus conventional approaches to outpatient diagnostic hysteroscopy: a two – centre randomized prospective study. Hum Reprod 2006; 21: 2996 – 3000.

11. Sagiv R, Boaz M, Dishi M et al. A new approach to office hysteroscopy compared with traditional hysteroscopy: a randomized controlled trial. Obstet Gynecol 2006; 108: 387 – 392.

12. Tangri MK, Lele P, Kapur K et al. Role of office hysteroscopy in gynecology: retrospective observational study at a tertiary care hospital. J Reprod Contracept Obstet Gynecol 2017; 6: 111 – 116.

13. Kumar P, Mohan S, Talwar P et al. Diagnostic Office Vaginohysteroscopy in Evaluation of Infertility Prior to IVF: A Retrospective Analysis of 1000 Cases. The Journal of Obstetrics and Gynecology of India 2017; 67: 275 – 281.

14. El-Mazny A, Abou-Salem N, El-Sherbiny W et al. Outpatient hysteroscopy: a routine investigation before assisted reproductive techniques? Fertility and Sterility 2011; 95: 271 – 276.

15. Pluchino N, Ninni F, Angioni et al.. Office vaginoscopic hysteroscopy in infertile women: Effects of Gynecologist experience, instrument size, and distention medium on patient discomfort. JMIG 2010; 17: 344 – 350.

16. Cooper N, Clark J. Ambulatory hysteroscopy. The Obstet & Gynecol 2013; 15: 159 – 166.

17. Munro MG, Kasiewicz JL, Desai VB. Office versus Institutional Operative Hysteroscopy: An Economic Model. JMIG 2022; 29: 535 – 548.

18. Deffieux X, T Gauthier, N Ménager et al. Prevention of the complications related to hysteroscopy: Guidelines for clinical practice. J Gynecol Obstet & Biol Reprod 2013; 42: 1031 – 1049.

19. de Freitas Fonseca M, Sessa FV, Resende JAD Jr et al. Identifying Predictors of Unacceptable Pain at Office Hysteroscopy. JMIG 2014; 21: 586–591.

20. Bettocchi S, Selvaggi L. A vaginoscopic approach to reduce the pain of office hysteroscopy. JMIG 1997 ; 4: 255 – 258.

21. De Angelis C, Santoro G, Re ME et al. Office hysteroscopy and compliance: mini-hysteroscopy versus traditional hysteroscopy in a randomized trial. Human Reproduction 2003; 18: 2441 – 2445.

22. Geha P, Waxman SG. Pain perception: Multiple matrices or one. JAMA Neurol. 2016; 73: 628–630.

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

23. Prathiba M. De Silva, , Paul P. Smith T. Justin Clark. Vaginoscopy for office hysteroscopy: A systematic review & meta-analysis. European Journal of Obstetrics & Gynecology and Reproductive Biology 2020; 22: 278-285.

24. Catherino WH, Eltoukhi HM, Al-Hendy A. Racial and Ethnic Differences in the Pathogenesis and Clinical Manifestations of Uterine Leiomyoma. Semin Reprod Med 2013; 31: 370-379.

25. Bettocchi S, Ceci O, Nappi L et al. Operative Office Hysteroscopy without Anesthesia: Analysis of 4863 Cases Performed with Mechanical Instruments. J Am Assoc Gynecol Laparosc 2004; 11: 59–61.

26. Keyhan S, Munro MG. Office Diagnostic and Operative Hysteroscopy Using Local Anesthesia Only: An Analysis of Patient Reported Pain and Other Procedural Outcomes. JMIG 2014; 21: 791–798.

27. Carta G, Palermo P, Marinangeli F et al. Waiting Time and Pain During Office Hysteroscopy. JMIG 2012 ; 19: 360–364.

28. Mboloko E, Nzau N, Lokengo L. Itinerary of woman seeking care for couple's infertility in Kinshasa. Ann Afr Med 2011; 4: 855 – 864.

29. Larsen U. Infertility in Central Africa. Tropical Medicine and International Health 2003; 8: 354-367.

Corresponding author: Nzau-Ngoma E emdango@gmail.com
DOI: 10.36205/ trocar3.2022006
Received 20-07-2022 - Accepted 14-9 -2022

THE INTERNATIONAL SOCIETY FOR GYNECOLOGIC ENDOSCOPY
PROMOTING VAGINAL SURGERY

TheTrocar
Official Online Journal of ISGE

TheTrocar Issue 3 Volume 3 / Page 71- 79 ISSN: 2736-5530

Haematometra following a caesarean section: a rare and avoidable complication (Case report)

Author: [1] Chrysostomou M, Locher JA [2], Chrysostomou A [3]

Affiliation:

[1] University of the Witwatersrand, Charlotte Maxeke Johannesburg Academic Hospital (CMJAH): Department of Obstetrics and Gynaecology; Corresponding author: dr.m.chrysostomou@gmail.com

[2] University of the Witwatersrand, Charlotte Maxeke Johannesburg Academic Hospital (CMJAH): Department of Obstetrics and Gynaecology

[3] University of the Witwatersrand, Charlotte Maxeke Johannesburg Academic Hospital (CMJAH): Department of Obstetrics and Gynaecology – Head of Urogynaecology

Abstract

Background: Haematometra is a condition which results in the blockage of the female urogenital tract, leading to an accumulation of blood in the uterus. This condition is more commonly noted to present due to congenital abnormalities, such as a transverse vaginal septum, but may also be acquired later on in life following procedures performed on or within the female genital tract. As noted in the literature however, haematometra following a caesarean section is a rare, and avoidable complication, and one that will be discussed in this case report.

Case: Our patient is a 31-year-old female, para 1 gravida 1, who underwent a low transverse caesarean section delivery for a prolonged second stage of labour at another institution. She

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

presented to us, three years after her caesarean section delivery, with severe pelvic pain and secondary amenorrhoea which resolved after vaginal excision at the apex of the vagina, and identification and dilatation of the cervix, which was covered entirely by the vaginal apex.

Conclusion: Systematic inspection of the vagina should be undertaken following a caesarean section. Haematometra following caesarean delivery, while rare, should be managed similarly to a high / transverse vaginal septum.

Key words:

Haematometra; caesarean section; transverse vaginal septum

Background:

Haematometra, which results from a partial or complete obstruction of the lower female outflow genital tract, may be congenital or acquired (1). This rare condition, results in a pathological accumulation of blood in the uterine cavity (2). Primary, or congenital, haematometra are most commonly noted in adolescents with congenital abnormalities of the lower genital tract such as an imperforate hymen, transverse vaginal septum, and vaginal stenosis (1,3). Secondary, or acquired haematometra occur in women with normal menses prior to amenorrhoea and are usually iatrogenic following procedures performed on the female genital tract, such as dilatation and curettage, cone biopsies, endometrial ablation, or cryocoagulation (1, 4). Other potential causes may be senile atrophy of the endocervical canal, endocervical malignancies and subsequent radiation therapy, scarring of the isthmus by synechiae (2, 4, 5). Haematometra following a caesarean section is a rare, and avoidable condition, with an unknown incidence rate (3). Management of haematometra as a result of a caesarean section, is most commonly by dilatation and evacuation of the haematometra, followed by a placement of an intrauterine catheter, thus allowing for continuous drainage (4, 6).

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

Case presentation:

Our patient is a 31-year-old female, para 1 gravida 1, who underwent a low transverse caesarean section delivery for a prolonged second stage of labour at a district hospital. Theatre notes from the time, documented that she had no underlying risk factors, and that the procedure itself was uneventful. She was discharged two days post-operation. Following the delivery, she breastfed for one year, and reports no use of contraception since the operation, until the date of presentation to our institution.

She presented to us, three years after her caesarean section delivery, with severe pelvic pain, which was increasing in severity since cessation of lactation, together with secondary amenorrhoea. The patient was admitted to the original institution where she had the initial procedure, 8 weeks prior to her presentation to us, where, according to the history and notes provided, an attempt was made to drain the haematometra, without any improvement or solution. For this reason, she was referred to our urogynaecology unit at the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) for further workup and management.

On presentation, the patient described the pain as a severe pressure that was localised within the pelvis, and radiating to the lower back. The pain was not improved or relieved by emptying of the bladder or analgesics. When discussing the cessation of her menses, she reported that prior to her caesarean section, she had regular menses (28-day cycle), with bleeding on days 1-4, with minimal, if any, pain. On examination of the patient, the patient was systemically stable and healthy, with normal vitals. On more focused examination, the abdomen was noted to be soft, non-peritonitic, with a palpable mass above the symphysis pubis extending to the umbilicus; an equivalence to an 18-week-uterus. The mass was non-tender, mobile, well-circumscribed, smooth, and with no ascites noted. On pelvic examination with a speculum, a normal vulva was noted, the vagina was smooth, normal in length and calibre, but was observed to be a blunt ending vagina (no cervix was noted), but with a pinpoint in the middle of the vaginal vault, which was found to be fluctuant on digital examination.

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

On medical workup for the patient, blood work was found to be within normal limits, as was the urine dipstick. A transvaginal ultrasound was done, showing a distended endometrial cavity with fluid collection and a stretched myometrium. Magnetic resonance imaging (MRI) was done in order to confirm our diagnosis of haematometra, which showed a massive fluid-filled antero-verted uterus, measuring 133mm in length, with the widest endometrial stripe being 17mm. A poorly defined cervix was observed with a thin, irregular ill-defined cervical canal, which was described as being a likely stenosis/stricture or as a result of a previous gynaecological intervention. There was no obvious discernible mass lesion noted, and fluid was observed within the vaginal canal (Figure 1).

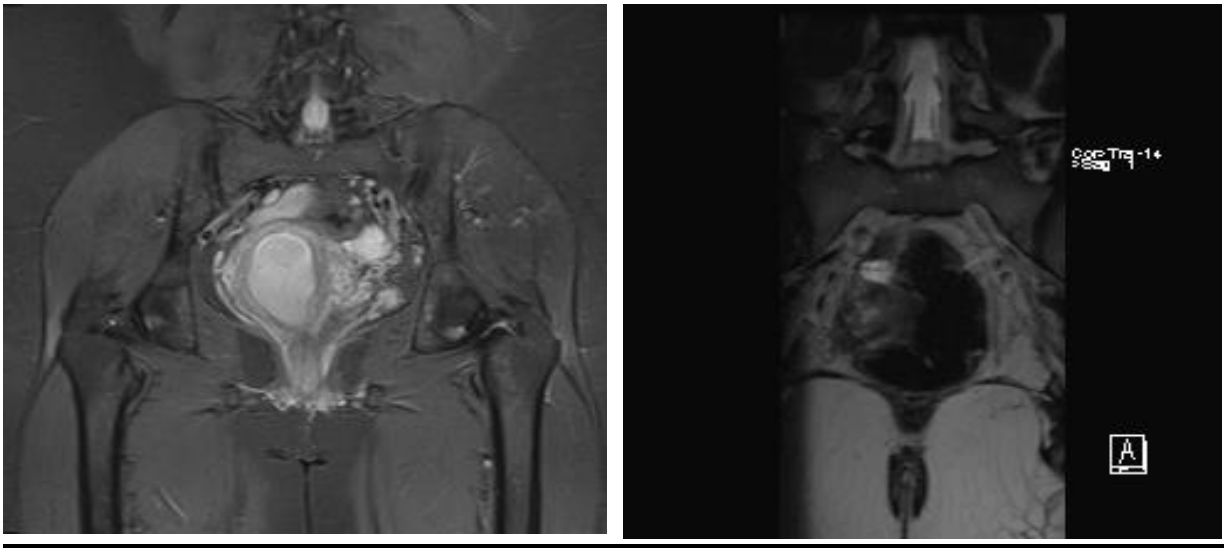


Figure 1: MRI done showing a large antero-verted uterus, with a poorly defined cervix; it demarcates a distinct separation between the cervix and the vaginal canal.

The patient was taken to theatre for examination under anaesthesia (EUA), and for definitive management of the haematometra. It was noted, that the cause of the haematometra was due to the suturing of the opening of the cervix during her previous caesarean section, done at the initial institution. This was noted as there was no communication between the vaginal vault and the cervical canal, which was also noted on her MRI. The surgical management of this patient, consisted of making a crucial incision at the level of the vaginal vault (Figure 2). The crucial incision was made once the bladder was catheterised and a Hegar dilator (number 8) was inserted into

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

the rectum, in order to avoid further injury to either the bladder or the rectum (Figure 3). Once the crucial incision was done, the cervix was identified. The anterior lip of the cervix was grasped using a Vulsellum forceps, the cervix was then dilated with Hegar dilators (up to number 8) and drained approximately 300ml of old blood. As opposed to the placement of an intrauterine catheter, to allow for continuous drainage, as noted in some cases in the literature (4, 6), a decision was made to insert a Mirena Intra-Uterine System (IUS). This was undertaken in order to maintain the communication between the cervix and the vaginal canal, as well as for its anti-estrogenic effects, which will result in endometrial atrophy, and cessation of the menses (Figure 4). Cessation of the menses was to prevent haematometra formation, as well as per the patient's request (prevention of pregnancy). Excess vagina was trimmed off, and the remaining vaginal edges were sutured by simple continuous suturing, in order to maintain the opening of the vagina (Figure 5).

Figure 2:

Crucial incision at the level of the vaginal vault.

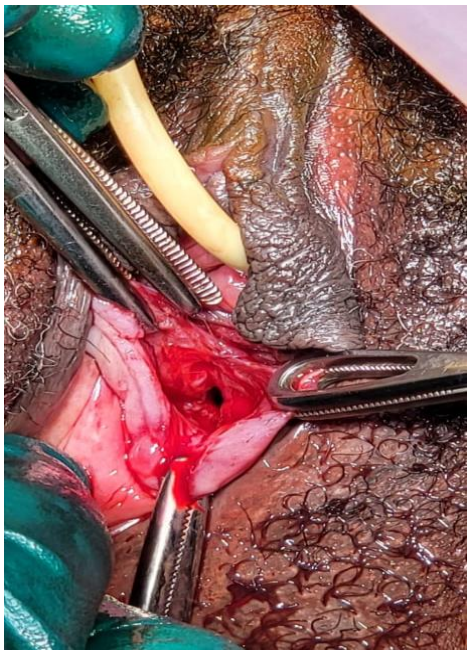


Figure 3:

Bladder catheterised and a Hegar dilator (number 8) inserted into the rectum; cervix dilated.

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

Figure 4:

Insertion of Mirena IUS.

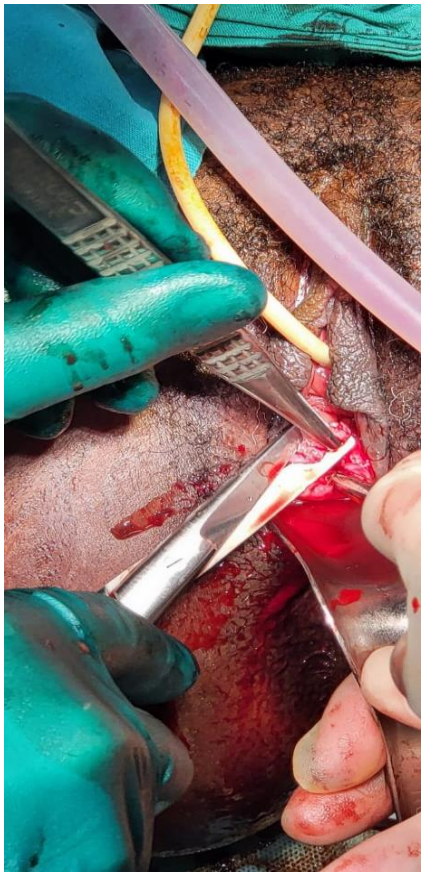


Figure 5:

Excess vagina trimmed off, and the remaining vaginal edges sutured in a manner to maintain the opening of the vagina.

Discussion:

Haematometra should be suspected in women with a history of secondary amenorrhoea with cyclical pain following a caesarean section delivery (7). Haematometra is a rare complication of a caesarean section, caused by a blockage of the genital outflow tracts in females, resulting in the pathological collection of menstrual blood in the uterus (4). It is a condition that is most commonly observed to be congenital (such as in cases of an imperforate hymen or transverse vaginal septum) but can also be acquired, most commonly with an underlying iatrogenic

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

cause (4). Literature has shown that there are a number of associated risk factors for haematometra, including, but not limited to: placenta praevia, placenta accreta and percreta, multiple previous caesarean sections, and previous cervical operative procedures (7). Haematometra following a caesarean section may be due to the inappropriate closure of the uterus, due to poor surgical technique, or due to the stitching of the anterior and posterior uterine walls, thus creating a uterine pouch where blood may accumulate over the years, as was the case for our patient (5). Transvaginal sonography is the first imaging modality for the diagnosis of haematometra (8, 9), which, in our case showed a distended endometrial cavity with fluid collection and a stretched myometrium. In order to confirm the diagnosis of haematometra, an MRI may be done in order to assess the uterine anatomy and level of obstruction (9, 10). An MRI may also provide information of any other associated changes, such as haematosalpinx. It allows for a more detailed evaluation of the anatomy in question, without exposing the patient to ionized radiation. In our case, the MRI was invaluable as it showed a massive fluid-filled antero-verted uterus, a poorly defined cervix with a thin, irregular ill-defined cervical canal, which was described as a result of a previous gynaecological intervention. In having a clear, detailed understanding of the patient's anatomy, together with the patient's risk factors in developing haematometra, a holistic and all-encompassing treatment plan may be constructed. The only identifiable risk factors in our case presented, included secondary amenorrhea, and a previous caesarean section coupled with poor surgical technique, which was done at her base district hospital. With increasing rates of caesarean section deliveries occurring on a global scale, there is an equivalent increase in rarer complications occurring such as haematometra (7). In order to reduce the risk of these complications becoming more common, we suggest some secure measures to be taken intra-operatively; It is advisable that after securing the angle of the uterine incision, a Hegar dilator (number 6 or 8) should be inserted through the cervix and then discarded. Once the communication of the uterine cavity, cervical canal, and vagina is confirmed, the uterine closure may then be performed with a single or double layer, respecting the correct approximation of the

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

cut margins (decidua, myometrium, serosa). In doing so, the accidental closure of the cervix may be avoided. Additionally, a thorough examination of the patient at follow-up (including pelvic) should be performed to rule out any iatrogenic complications (3).

Conclusion:

Whilst haematometra is a rare condition, it should always be a differential diagnosis in patients presenting with amenorrhoea and cyclical pain when other common causes are ruled out. The index of suspicion will be raised when there are positive findings on ultrasonography, and the patient has risk factors (for either congenital or acquired haematometra). As in our case, systematic inspection of the vagina should be undertaken following a caesarean section. Haematometra following caesarean delivery, where possible, should be managed similarly to a high / transverse vaginal septum.

References:

1.1 Kaur G, Jain S, Sharma A, Vaid NB. Hematometra formation – a rare complication of caesarean delivery. J Clin Diagn Res. 2014; 8(8):3-4.

DOI: 10.7860/JCDR/2014/8364.4689

2.Chou B, Bohn JA, Mairs R. Acute abdominal pain caused by hematometra in an adolescent female: a case report. J Med Case Rep. 2016; 10(1): 369

DOI: 10.1186/s13256-016-1154-6

3.Gabby LC, McDaniel KE, Gordon BJ, Al-Marayati LA. Hematometrocolpos following low transvers caesarean delivery complicated by uterine dehiscence. Case Rep Obstet Gynecol. 2021; 1-3.

DOI: 10.1155/2021/5591893

4.Tolefac PN, Theophile NN, Tchente CN, Yeika E, Adamo B, Priso EB. Case report of haematometra and cervico-isthmic adhesions following caesarean section in resource-low setting. Clin Res Trials. 2017; 3(5): 1-3.

DOI: 10.15761/CRT.1000191

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

5.Saeed GA. Case of postoperative haematometra in a 40-year-old woman, East Mediterr Health J. 2010; 16(2): 237-239.

6.Noor C, Patankar S, Winter-Roach B. An unusual case of hematometra in a postmenopausal woman associated with Manchester repair. J Low Genit Tract Dis. 2012; 16: 162-164.

7.Basaran OE, Guvendag-Guven ES, Guven S. Haematocervix as an uncommon complication of caesarean delivery: a case report. Gynecol Obstet Reprod Med. 2020; 26(3): 227-228.

8.Scheerer LJ, Bartolucci L. Transvaginal sonography in the evaluation of hematometra. A report of two cases. J Reprod Med. 1996; 41(3):205-206.

9.Nalaboff KM, Pellerito JS, Ban-Levi E. Imaging the endometrium: disease and normal variants. Radiographics. 2001; 21(6): 1409-1424.

DOI: 10.1148/radiographics.21.6.g01nv211409.

10.Cox MG, Gould SW, Podberesky DJ, Epelman M. Magnetic resonance imaging of acquired disorders of the pediatric female pelvis other than neoplasm. Pediatr Radiol. 2016; 46:806-817.

Corresponding author: dr.m.chrysostomou@gmail.com
DOI: 10.36205/ trocar3.2022005
Received 7-2022 Accepted 9 - 2022

THE INTERNATIONAL SOCIETY FOR GYNECOLOGIC ENDOSCOPY
PROMOTING VAGINAL SURGERY

TheTrocar
Official Online Journal of ISGE

TheTrocar Issue 3 Volume 3 / Page 80 ISSN: 2736-5530

Hysterectomy starts with a correct diagnosis the role of hysteroscopy in eluding some pitfalls of histopathology (1)

Author: Amal Drizi[1]

Affiliation: [1] Independent consultant in obstetrics and gynecology, Algiers, Algeria.

Abstract

Video -Webinar of Dr. Amal Drizi

Corresponding author: Amal Drizi
DOI: 10.36205/ trocarvid3.2022001
Received 8 - 2022 Accepted 9 - 2022

THE INTERNATIONAL SOCIETY FOR GYNECOLOGIC ENDOSCOPY
PROMOTING VAGINAL SURGERY

the Trocar
Official Online Journal of ISGE

TheTrocar Issue3 Volume 3 / Page 81-84 ISSN: 2736-5530

Video Article: Endometrial hyperplastic polypoid pattern,Tamoxifen induced, treated by the Intrauterine Bigatti Shaver (IBS®)

Author: Xia Yin[1], Giuseppe Bigatti[1]

Affiliation: [1] Sino European Life Expert Centre, Renji Hospital, Shanghai Jiao Tong University School of Medicine

Abstract

To prove the effectiveness of the Shaver technique in the treatment of multiple polyps and hyperplasia even when induced by prolonged Tamoxifen therapy

Key words:

Operative hysteroscopy; Polypoid hyperplasia; Intrauterine Bigatti Shaver; Hysteroscopy

Corresponding author: Xia Yin
DOI: 10.36205/trocarvid3.2022002
Received 7 - 2022- Accepted 9 - 2022

The Trocar
Official Online Journal of ISGE

Abstract

Study Objective: To prove the effectiveness of the Shaver technique for multiple polyps and hyperplasia treatment, even when induced by prolonged Tamoxifen therapy.

Design: Descriptions of the surgical steps and prognosis according to a case report

Setting: "SELEC Sino European Life Expert Centre" of Jiao Tong University, Shanghai

Patient: A 45-year-old nullipara woman with a medical history of one abortion. In June 2021 she was diagnosed with stage IIA breast ductal cancer. She underwent a radical unilateral mastectomy in July 2021. After 20 cycles of adjuvant radiotherapy, 20mg of Tamoxifen, per os daily, was administrated. The patient reported no more menstrual period after radiotherapy and every three months after the operation she underwent a careful follow-up with pelvic examination and transvaginal ultrasound. After one year of therapy the patient developed abnormal uterine bleeding and during the scheduled check, an endometrial thickness of 12 mm was reported. To exclude the presence of malignancy a diagnostic hysteroscopy with histological evaluation was planned. The result showed the presence of a simple non atypical polypoid hyperplasia and therefore an operative hysteroscopy was planned.

Intervention: The operative hysteroscopy was performed with the Intrauterine Bigatti Shaver (IBS®). The Shaver 24Fr optical system with the SA blade was used. The rotation rate of the blade was 2100 rotations per minute (rpm) with a suction flow of 250 ml per minute. As it was reported during diagnostic hysteroscopy, the uterine cavity showed the presence of a polypoid hyperplastic endometrium. The Shaver SA blade was able to remove all the multiple polyps together with the related hyperplastic endometrium in a very short time. A perfect uterine cavity with a regular endometrial surface was restored. No intra-operatory bleeding was reported and a perfect vision was maintained during the whole procedure. The operative hysteroscopy lasted about 3 minutes without any intraoperative complications. To prevent adhesion formation a Materegen gel® by Bioregen was left in place at the end of the procedure. The patient was discharged from the hospital two hours after the operation.

Main Result: The histological exam confirmed the previous benign endometrial biopsy result. Following patient consultation, it was decided to continue with the Tamoxifen therapy subject to strict follow-up with regular checks and ultrasound every 3 months according to our Renji Hospital Guidelines.

Conclusion: The use of the shaver technique has already proven to be the best choice to remove polyps and hyperplastic endometrium. In a randomized control study, published by Bigatti et al. (2011), it has been shown that the time of the procedure, the fluid deficit and the learning curve for the surgeon is statistically significant better for the shaver technique compared to bipolar resection. Also, for all types of myomas including G1 and G2, the shaver technique

Corresponding author:
DOI: 10.36205/trocarvid3.2022002
Received 7 - 2022- Accepted 9 - 2022

has proven to be a valid alternative to resection if the size is less than 3 cm in diameter. In another retrospective study always by Bigatti et al (2013) it has been proven that almost 93.5% of myomas less than 3 cm could be removed with the shaver technique in a single step procedure and 62.5% of these were G2 myomas. In addition, in an ongoing retrospective study on 1000 shaver polypectomies and endometrial resection at the SELEC of Shanghai we have found that the recurrence rate is only 0.3%. After 12 months from the original surgical procedure only 3 patients developed polyps and hyperplastic endometrium. The shaver technique is able remove the endometrial functional layer without affecting the basal layer. This new technique acts like a normal D&C under vision, reducing the risk of complications. The use of the shaver technique in case of Tamoxifen induced hyperplasia has an additional advantage of reducing the risk of postsurgical adhesions. In case of prolonged Tamoxifen treatment, the presence of a normal uterine cavity will allow the possibility to early detect a malignant evolution of the endometrial layer. This case report shows that the Shaver technique for multiple polyps, with or without hyperplasia, even when Tamoxifen induced, should be the treatment of choice. The Shaver technique can remove all the hyperplastic endometrium of the uterine cavity in a very easy, fast, clear, safe and precise way as it is shown in our video. The Bigatti Shaver technique allows to perform a Visual D&C procedure, improving the quality of the result and reducing the risk of complications.

Key words: Operative hysteroscopy; Polypoid hyperplasia; Intrauterine Bigatti Shaver; Hysteroscopy

References

[1] Yin X, Cheng J, Ansari SH et al. Hysteroscopic tissue removal systems for the treatment of intrauterine pathology: a systematic review and meta-analysis. Facts Views Vis Obgyn. 2018;10(4):207-213.

[2] Bigatti G. IBS® Integrated Bigatti Shaver, an alternative approach to operative hysteroscopy. Gynecol Surg. 2011; 8: 187–191.

[3] Salim S, Won H, Nesbitt-Hawes E, Campbell N, Abbott J. Diagnosis and management of endometrial polyps: a critical review of the literature. J Minim Invasive Gynecol. 2011;18(5):569-581.

Corresponding author:
DOI: 10.36205/trocarvid3.2022002
Received 7 - 2022- Accepted 9 - 2022

[4] Lee M, Piao J, Jeon MJ. Risk Factors Associated with Endometrial Pathology in Premenopausal Breast Cancer Patients Treated with Tamoxifen. Yonsei Med J. 2020; 61(4):317-322.

[5] Vilos GA, Alzawawi N, Oraif A et al. Hysteroscopic Endometrial Resection in Women Treated With Tamoxifen for Breast Cancer Provides Definitive Diagnosis and Effective Long-Term Therapy. J Obstet Gynaecol Can. 2020; 44(5):517-520.

[6] Bigatti G, Ferrario C et al. IBS® Integrated Bigatti Shaver versus conventional bipolar resectoscopy: a randomised comparative study. Gynecol Surg. 2011; 9:63-7

[7] Bigatti G, Franchetti S et al. Hysteroscopic myomectomy with the IBS® Integrated Bigatti Shaver versu conventional bipolar resectoscope a retrospective comparative study .Gynecol Surg. 2013; 11: 9-18

[8] Bigatti G, Campo R Sino European Life Expert Centre Renji Hospital Guidelines - Renji Hospital Yaotong University Shanghai. 2020; Universa Publisher - Honderweg 24, 9230 Wetteren Belgium- info@universa.be IS

Corresponding author:
DOI: 10.36205/trocarvid3.2022002
Received 7 - 2022- Accepted 9 - 2022