



# the Trocar Official Online Journal of ISGE



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Dear friends of ISGE dear readers,

I am pleased to present you a very interesting issue of our magazine at the end of the year. The ISGE was already founded as a teaching community and has felt committed to the needs of the less developed regions of the world in recent decades and has lived it. Our last regional meeting in Cameroon focused on the needs of regions with limited material resources. We are very pleased to have colleagues on board who come from these regions and can formulate exactly what the real needs are. More than 60% of the world's population does not have access to adequate surgical care, and we must be aware of this when we talk about high-tech medicine on the one hand and global teaching on the other. It is important that we adapt to the possibilities of the respective regions of the world and not the other way around. Technological adjustments are also required. Medical products and medical technology are mainly developed in the so-called industrialized countries and marketed worldwide. Due to European or American regulations, these tools and products are not affordable in low-income countries or benefit only a small group of wealthy people. Therefore, local medical production, technical maintenance facilities and the use of local know-how are also required. Article 4 deals precisely with this important perspective.

In this issue (issue 4 volume 3) we have included articles from Africa, South and Central America, New Zealand, Europe and China. The development and focus of our journal is certainly one of the highlights of ISGE, in addition to the continuous development of our programs. We hope that in the new year numerous endoscopic societies will join us and the number of people who support our project will grow steadily. In a very turbulent time of international crises, wars and climate catastrophes, it is conciliatory that many physicians are working together on a global project. Join us and become a member of ISGE or encourage your local endoscopy societies to work with ISGE.

We wish you a happy new year and continued enjoyment of medicine!

For editors:

Günter Noé

Chief editor



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The frontpage shows displaced sling after pectopexy with small PP sling, detachment at the cervix (1) and sacropexy single after 4 years (2)



## Recommendations for the application of laparoscopic surgery in gynaecology ISGE Gynaec-Oncology Task Force

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### Abstract

Laparoscopic surgery has a significant role in surgical management of early gynecological cancers (ovarian, cervical and endometrial cancer). Laparoscopic surgery is associated with well known advantages over open surgery (less blood loss, shorter hospital stay, quicker recovery, less post operative complications). Regarding oncological outcomes, overall survival (OS), and disease-free survival (DFS) further randomized trials are required to confirm that these two surgical techniques have similar outcomes. Until that data are available, laparoscopic surgery in treating gynecological malignancies should be used with caution. Adequate training and equipment are paramount. Patients should be carefully selected. Results collected and audited, and patients properly counselled and consented. In this article we review published data on application, safety and results of laparoscopic surgery in the gynaec-oncology field.

**Key words:** laparoscopic surgery, cervical cancer, ovarian cancer, endometrial cancer

## Introduction:

Since the introduction of laparoscopic surgery in clinical practice during the 1980's, the number of different operations and indications for laparoscopic surgery in gynecological oncology has been increasing steadily. This increase was driven by technological advances in the field of endoscopic surgery, the developing experience of individual surgeons and patient demands for shorter hospital stays, quicker recovery, and a better aesthetic result. In this article we critically appraise published results and make recommendations based upon the available evidence. We will address the application of laparoscopic surgery to the treatment of ovarian, cervical, and endometrial cancer.

## Ovarian Cancer

Ovarian carcinoma is in some countries the most common malignant tumor in gynecology in the developed world (1). It is the most lethal gynecological malignancy with an overall survival of 46% (2,3)(3) and with a 5 year survival in advanced stage of between 30-40% (4). The main reason for the poor survival is that the majority of patients (70-80%) present with stage III or IV disease (5,6) because early-stage disease is essentially asymptomatic.

### *Laparoscopy in stage I ovarian carcinoma*

If a cancer is presumed to be stage I on imaging, the first line of treatment is surgery. This involves aspiration of ascites/peritoneal washings for cytology, hysterectomy with bilateral salpingo-oophorectomy, omentectomy, +/- pelvic and para-aortic lymphadenectomy (not universally recommended practice) (7,8) and biopsy of any suspicious areas for complete staging. Frozen sections during the operation are utilized in many centers for the intraoperative

diagnosis of ovarian cancer. The importance of comprehensive staging is that patients with stage IA and IB, grade 1 and 2 tumors may avoid adjuvant chemotherapy, as there is no proven survival benefit (9). In grade 3 cancers adjuvant chemotherapy is recommended, hence the value of pelvic/para-aortic lymphadenectomy to select patients for adjuvant treatment is limited. For many decades the main approach for this surgery was by midline laparotomy. Conservative surgery can be considered in exceptional circumstances, in young patients with unilateral truly stage I ovarian carcinoma, who wish to preserve fertility or ovarian hormonal function.

During the 1990's and the beginning of the 21st century a number of articles were published reporting surgical staging of stage I ovarian carcinoma utilizing a laparoscopic approach (7,10–14). Most studies reporting on the results of laparoscopic treatment of early ovarian carcinoma concluded that laparoscopic staging is a safe and technically feasible procedure (15–17). A significant number of cases were re-staging procedures as the diagnosis of ovarian carcinoma was only established from histology of the original oophorectomy or cystectomy. The original surgery was often performed by a non-gynecological oncology surgeon.

The laparoscopic approach has all the advantages of reduced blood loss; faster recovery and shorter hospital stay; fewer post-operative complications; better visualization of tumor deposits; better aesthetic results and a quicker start to post-operative chemotherapy, when indicated. However, laparoscopy has been associated with a higher rate of intraoperative tumor rupture which may result in upstaging (18,19). It has been proposed that performance of para-aortic lymphadenectomy might be technically difficult in some patients and that



operative time is longer as compared to laparotomy. Other potential considerations are of port site metastasis and the theory that CO<sub>2</sub> lowers abdominal pH and activates enzymes which increase tumor cell mitoses and growth factors, potentially promoting metastasis (20,21).

Large systematic reviews (22–25) have identified more than 1000 records relating to this topic but after scrutinizing the sources the authors found no more than 11 studies which were eligible for meta-analysis. Furthermore, none of the studies were randomized, which introduces a high level of bias and patient selection.

Considering the published data and conclusions of the meta-analyses, the consensus is that laparoscopic management and staging of stage I ovarian carcinoma is feasible, but because of the lack of grade I evidence most national guidelines still recommend surgical management and staging to be performed via laparotomy (8). The German Gynaecological Oncology Group has included the laparoscopic procedure as an option in their guidelines. The caveat is that this approach is reserved for selected patients (with minimal risk of cyst rupture) and the surgery is to be performed by expert laparoscopic oncology surgeons (26). Overall survival (OS) and disease-free survival (DFS) data in published studies, comparing laparoscopy versus laparotomy for stage I ovarian carcinoma, are extremely limited and no clear evidence exist that survival data are either equivalent or in favor of a laparoscopic approach. However, some meta-analyses (23–25) concluded that no difference was observed between the two approaches in terms of overall survival (OS) and progression-free survival (PFS), but these were based on non-randomized studies.

There is no doubt that further high-quality studies, in particularly large, randomized trials, are required to give a clear answer to this question. In the meantime, laparoscopic management/restaging of stage I ovarian cancer should be limited to carefully selected patients and should be performed by expert laparoscopic oncology surgeons, without cyst spillage and with the specimen retrieved in a bag.

#### Laparoscopic assessment of operability for advanced ovarian carcinoma

The presence of residual disease after primary surgery for advanced ovarian cancer is a significant adverse prognostic factor. The aim of primary debulking surgery is to remove disease completely, leaving no visible disease after surgery. Some authors use a cut-off figure of <1cm of residual disease to define optimal surgical debulking. Depending upon reported results, up to 60% of the patients are left with disease up to 1cm and these patients would likely have benefitted from neoadjuvant chemotherapy (NACT) prior to debulking surgery. It is important to identify the subset of patients who would do better with NACT followed by surgery. Imaging techniques, including ultrasound (US), computerized tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET) do not have a satisfactory sensitivity to select these patients. As an alternative, preoperative laparoscopy with or without biopsy has been investigated to establish whether it can better predict resectability of disease over and above standard imaging protocols. The overall risk of injury for diagnostic laparoscopy used for this indication is 1% - 5% depending on the type of procedure and the patient population (27).

A systematic Cochrane review analyzed 18 studies of diagnostic laparoscopy in this context of which one was a randomized controlled trial. Laparoscopic preoperative assessment predicted resectability to no visible residual disease in 54% to 96% of the cases and when the criterion of prediction of >1cm residual disease was used, the accuracy was between 69% and 100% in analyzed studies. Because of large heterogeneity, pooling of the data was not possible for meta-analysis (28). There is the limitation that in some studies laparotomy was only performed when laparoscopy suggested that debulking to <1 cm was possible but not for the other cases, hence introducing bias.

Although it appears that laparoscopy improves the accuracy of prediction of resectability to no residual disease, some patients undergoing laparotomy nevertheless end up with residual disease of >1 cm. Again, the effectiveness of this procedure depends upon the experience of the surgeon performing the laparoscopy and primary debulking surgery. Published studies have included very different designs and patient cohorts (29–34). The most important parameter with regards to diagnostic laparoscopy relates to the proportion of women falsely predicted to have no residual disease after primary debulking surgery as such cases would undergo unnecessary, unsuccessful debulking surgery. Vergote 2010 (35); and Kehoe 2015 (36) showed that treatment with NACT was associated with no worse prognosis in advanced ovarian carcinoma as compared to primary debulking surgery. In analyzed studies negative predictive values (NPV) ranged from 0.54 to 0.96 for microscopic complete debulking which means that of 100 women referred for primary debulking surgery, after laparoscopic assessment, between 4 and 46 would be left with

visible residual disease. All studies report on the added value of preoperative diagnostic laparoscopy, without an increased risk of complications. It seems that diagnostic laparoscopy to assess optimal resectability in advanced ovarian carcinoma has its place in clinical practice, but future research should focus on selection criteria of women who might benefit from this procedure.

#### *Laparoscopic surgery in patients post NACT*

After it was demonstrated that the safety and benefit of interval debulking surgery post NACT compared favourably with primary debulking surgery in advanced ovarian carcinoma, there has been increasing interest in performing this surgery laparoscopically in patients with a complete radiological response (37–42). Published studies have shown the feasibility of this approach, benefiting approximately 15% of the patients, but evidence of a favourable outcome is still not clear. There are certainly well-known benefits to patients if this surgery is performed laparoscopically, but there is no strong evidence that outcome in terms of DFS and OS is comparable or better than for laparotomy. Further studies are necessary to support this approach. Currently laparoscopic interval debulking can be offered to patients with a complete radiological response in the setting of a study, until further evidence emerges as to for which subgroups of patients this approach performs in a manner equal to or better than laparotomy.

#### ***Cervical Cancer***

Cervical cancer is still a significant health problem with an estimated 604,000 new cancer cases worldwide and 342,000 deaths in 2020 (43). In countries with no access to cervical

cancer screening the incidence is 17.8 cases per 100,000 women with a mortality rate of 9.8 per 100,000 (44). In developed countries, due to vaccination and screening programs there has been a 75% decrease in incidence and mortality of cervical cancer over the past 50 years (45). In those countries with screening there has been an apparent stage shift at the time of diagnosis towards early-stage disease, with a significant number of cases now diagnosed at stage I disease. For patients who do not wish to preserve fertility, radical hysterectomy (RH) with surgical assessment of pelvic +/- para-aortic lymph nodal status is recommended as a standard treatment for early-stage cervical cancer: stage IB1-IIA as defined by the International Federation of Gynecology and Obstetrics (FIGO).

For more than a century open radical hysterectomy (ORH) was the procedure of choice in the management of early cervical carcinoma. This operation was first described by E. Wertheim in 1898, and the alternative was radical vaginal hysterectomy described by his contemporary F. Schauta (46,47) Lymph nodal metastasis is the most important prognostic factor and Meigs introduced pelvic lymphadenectomy as a standard addition to RH in the management of early cervical carcinoma (48–51). In 1992 Nezhat described laparoscopic radical hysterectomy (LRH) with pelvic lymphadenectomy. Bilateral pelvic node dissection is used to assess nodal status and the complications of this procedure include lymphocyst formation, leg lymphoedema and less commonly, vessel and nerve injury (52,53). Alternatively, sentinel lymph node biopsy (SLNB) can be performed with a similar, if not superior detection rate of involved nodes, with reduced postoperative side effects (54–60). The majority

of the published data on SLN in cervical carcinoma including recent systematic reviews suggests that this method is accurate in detecting metastasis to the pelvic and para-aortic lymph nodes, with a promising low false negative rate (56). There are no randomized controlled studies confirming this hypothesis. Currently the SENTICOL III randomized trial is underway to provide further grade I evidence.

Lymph nodes are routinely processed in paraffin embedded blocks with one haematoxylin and eosin (H and E) stained slide per node. All SLNs should be processed initially with an H and E section and if this section is benign, then ultrastaged as described previously (53,54). Some centers perform frozen section assessment of lymph nodes if they are reported as possibly involved on preoperative imaging. In these cases, if a lymph node is found to be positive intraoperatively, the surgical operation is abandoned, and patients are offered radical chemoradiotherapy instead. According to international criteria, metastatic disease in lymph nodes is classified by size as macrometastatic ( $>2\text{mm}$ ), micrometastatic ( $>0.2\text{--}2\text{mm}$ ) or as isolated tumor cells ( $\leq 0.2\text{mm}$ ).

Total laparoscopic hysterectomy (TLH) is accepted treatment for stage IA1 and low risk IA2 cervical carcinoma, for patients who do not wish to preserve fertility. Radical hysterectomy has been the main treatment for early cervical carcinoma of high-risk stage IA2 to IIA for more than a century. Open radical hysterectomy with pelvic lymphadenectomy was the surgical gold standard until 1992, when laparoscopic radical hysterectomy (LRH) was described (61). In subsequent years Minimally Invasive Surgery (MIS), gained significant popularity as surgical treatment of early cervical carcinoma. These surgical techniques were associated with less



intraoperative blood loss; fewer postoperative complications (infections, deep venous thrombosis); less analgesic needed for postoperative pain; a shorter hospital stay; quicker recovery and better aesthetic results (62–64). These procedures quickly became the favored approach for both patients and many surgeons. Initial publications suggested a similar oncological outcome as compared with classical open radical hysterectomy. However, none of these early studies were randomized trials (65–70). With respect to oncological outcome such as DFS and OS, the majority of published studies did not find a significant difference between open and laparoscopic approaches for early cervical cancer (62–70). However, these data were not from randomized controlled trials.

The Laparoscopic Approach for Cervical Cancer (LACC) was the first randomized controlled, multicenter trial comparing MIS with open surgery, published in 2018. This trial raised concerns that MIS had an inferior oncological outcome when compared with the open approach in the management of early cervical carcinoma. Minimally Invasive Surgery (laparoscopic and robotic radical hysterectomy) had a 4.5-year DFS of 86.0% compared with 96.5% for open radical hysterectomy (10.5% difference between the groups 95% CI: -16.4 to -4.7;  $p=0.87$  for non-inferiority). The 3 year OS rates were 93.8% for the MIS arm and 99.0% for the open approach (HR for death from any cause, 6.00; 95% CI: 1.77 to 20.30) (71). This publication was the first randomized trial comparing MIS and the traditional open technique and it had a major impact on clinical practice around the world. As a result of this publication, some societies (ESGO, NCCN, BGCS) changed their recommendations with respect to MIS in the management of early cervical carcinoma. Many institutions and

individual surgeons stopped performing LRH or changed their indications for MIS in early cervical cancer. Although the results from the LACC trial made a major contribution to clinical practice in the surgical management of early cervical cancer, criticisms have been raised regarding the trial and there remain a number of valid unanswered questions.

Several renowned centers, with significant experiences and with published data on LRH and RRH, did not take part in this trial. Some clinicians raised concerns regarding the low level of surgical experience (previous experience of 20 cases of LRH) as the entry criterion to the LACC trial. This is a low number of cases to gain proficiency in this difficult surgical procedure which is associated with a long learning curve.

In addition, with participation of 33 centers in total, some of the centers recruited fewer than 10 patients each which also raises questions regarding the experience of these centers with RLH. Results shown in the open arm were also far superior than ever published previously.

Our own data over 15 years, for 100 patients that underwent a LRH performed for tumors > 2cm in diameter, in terms of DFS and OS are almost identical when compared to the open arm of the LACC trial, with a minimum of 5 years of follow up. In our cohort of patients, 13% required adjuvant treatment compared with 33% in the LACC trial.

Our study with RLH and SLNB only in the management of early cervical carcinoma as compared to the LACC trial, does not appear to be associated with any higher recurrence rate or mortality in the selected group of patients with cervical cancer <2 cm in size (55,60).

It has been suggested that the increased recurrence rate in the vagina and pelvis in the MIS arms of the LACC and SUCCOR (72) studies may be due to uterine manipulation during laparoscopic surgery. In our practice we used a McCartney tube (which does not have intrauterine component) to manipulate the uterus and outline the vaginal vault and we did not observe an increase in vaginal vault or central pelvic recurrences. The other suggested technique, to reduce vaginal vault recurrences, is to perform RLH without a manipulator and with closure of vagina vault which is done as the first step of the operation.

## CONCLUSION

After publication of the LACC trial in 2018 many institutions have abandoned RLH in the management of early cervical carcinoma. However, our experience over 15 years and non-randomized studies published prior to 2018 demonstrate the safety of LRH in the management of FIGO 2018 high risk stage IA2 and stage IB1 and IB2 cervical carcinoma.

There is a clear need for another randomized controlled trial to provide evidence for the place of RLH in the management of early cervical carcinoma. There is a need to clearly identify the cohort of patients who would benefit from a laparoscopic approach to define the safest technique and to define the radicality of the surgery. Currently If RLH is considered for the management of cervical carcinoma of stage IA2 – IB2 all patients require informed consent with an explanation of the results from both the LACC trial as well as the results of the individual center treating that patient. All results, DFS, OS, and complications, should be prospectively recorded

and reported at clinical governance meetings and monitored by the institution. Patients with bulky lymph nodes identified on preoperative imaging or intraoperatively should be excluded from the SLN only procedure and treated as per center protocol for possible positive lymph nodes. Unilateral SLN detection requires a full contralateral pelvic node dissection. Pathological ultrastaging should be standard procedure in the assessment of the SLN. Further data are required regarding the clinical significance of ultrastage-detected micrometastasis and isolated tumor cells to guide appropriate management.

## *Endometrial Cancer*

Worldwide, endometrial cancer is the sixth most commonly diagnosed malignancy in women and the most commonly diagnosed gynecological malignancy in the developed world (4).

-The incidence in the United Kingdom has increased by around 55% since the 1990s (73) and this is thought mainly due to increasing rates of obesity and life expectancy (74). Obesity (75), nulliparity and the presence of Lynch Syndrome are risk factors of the most significance (76). The disease is predominantly a condition of postmenopausal women. Seventy-one percent of cases are stage I at presentation which carries an excellent prognosis; 90% of women are disease-free five years following surgery (77).

Laparoscopy for the management of early stage endometrial cancer

The current standard of treatment for FIGO stage I endometrial cancer (78) involves removal of the uterus, tubes and ovaries +/- lymphadenectomy, without vaginal cuff and nor parametrectomy

(79). For stage II disease, total hysterectomy and bilateral salpingo-oophorectomy is adequate, unless a radical hysterectomy is required to achieve macroscopic disease-free margins. A meta-analysis in 2019 suggested that there was no significant benefit in terms of overall survival or progression free survival from radical hysterectomy (80) for stage II disease. Patients with stage III/IV disease are often referred for adjuvant treatments such as external beam radiotherapy and/or chemotherapy to reduce disease burden. A meta-analysis by Barlin et al. suggested that there is a 9.3 month increase in survival associated with each 10% increase of cytoreduction towards no gross evidence of disease (81). There is very limited evidence for the role of laparoscopic surgery as treatment for endometrial cancer greater than stage I.

Several randomized controlled trials examining laparoscopy versus laparotomy for the treatment of early stage endometrial cancer including Walker's study of 2016 patients (82) and Janda's 'LACE' trial (83) have shown no significant difference in overall survival and disease free survival between either type of surgery (84). This was demonstrated by a Cochrane review of 2018 with the same research question examining 9 randomized controlled trials. Six of the studies examined survival and found no significant difference (with moderate evidence levels) between women who underwent laparoscopic surgery and women who underwent laparotomy ( $n = 3993$ ) (HR 1.04, 95% 0.86 to 1.25) (85). Five of the studies included showed no difference in the probability of disease recurrence. Notably, there was no difference in rates of perioperative death or bladder, ureteric or bowel injury. On average, postoperative hospital stay was significantly shorter in the laparoscopy group (86). The literature is almost unanimous to the

effect that recommendations from governing bodies strongly recommend removal of the uterus, cervix and tubes without morcellation or dissection, to reduce the risk of cancer cell seeding.

### **Laparoscopy in the role of lymph node staging**

Lymphadenectomy is considered a staging procedure by the British Gynaecological Cancer Society (BGCS) (79) and the European Society of Gynaecological Oncology (ESGO) (86) to assess the extent of disease and therefore provide information to guide adjuvant treatment decisions. These recommendations are following evidence from two randomised trials that suggested systematic lymph node staging has no therapeutic benefit (87,88). Although formally staged histologically, the stage and grade of endometrial cancer is often established prior to surgery by MRI and endometrial biopsies. Following Vargas' analysis of 19,329 women included in Surveillance Epidemiology and End Results (SEER) data published in 2014, low risk endometrial cancer (stage 1A, grade 1-2, tumour size <2cm) has a 1.4% probability of lymph node metastasis (89). Therefore, the BGCS does not recommend lymphadenectomy for non-bulky nodes, especially for low-risk endometrial cancers (79). This is in light of the known increased risk of lower limb lymphoedema, highlighted by one study to increase by 6% for every lymph node surgically removed (90). However, our unpublished results and a few other studies, demonstrated a higher percentage of involved lymph nodes, especially in stage IB, of up to 15% of cases. Another problem in making a decision to perform lymphadenectomy in patients with a G1 tumor on biopsy is that after final histology on the hysterectomy there is upgrading in up to 20 – 30 % of cases.

For higher risk endometrial cancers (>stage IA, grade 3, tumor size >2cm) in which up to 6% - 30% of patients might have lymph node metastases [93], sentinel lymph node biopsy is recommended by the BGCS (79) and ESGO (86) as a way of reducing post-operative morbidity yet obtaining staging information to guide adjuvant treatment. This guidance follows the “FIRES” study in 2017 (91) and separate studies on both low risk, early stage endometrial cancers (92) and patients with high grade disease (93).

Indocyanine green dye (ICG) has been found to be superior to methylene blue dye in a recent randomized controlled trial (94) and in a separate study, technetium 99 in combination with ICG did not improve detection rates when compared to ICG alone (95). In order to facilitate the detection of ICG uptake in sentinel lymph nodes, laparoscopic and robotic assisted surgical approaches are recommended as part of a number of recommendations included in a BGCS

consensus statement on sentinel lymph node technology (32).

### **Conclusion:**

Laparoscopic surgery has a significant role in the management of gynecological malignancies (ovary, cervix, endometrium). However, most evidence is not from randomized trials and needs further grade 1 evidence studies before the specific role for this type of surgery is clear. Till then, it is paramount that results related to individual surgeons/ institutions are recorded and regularly audited. Surgeons need to be adequately trained to perform this type of surgery and patients appropriately selected. Complexity of these operations require up-to-date laparoscopic equipment. Patients need to be informed of published results as well as of individual surgeons/institution results. Informed consent for laparoscopic procedure needs to be obtained.

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## Laparoscopic Hysterectomy training program at Te Whatu Ora Counties Manukau

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### Abstract

Hysterectomy is the most frequently performed major gynaecological procedure. Traditionally performed as an abdominal or open operation, laparoscopy has demonstrated to be both effective and safe with multiple well-established advantages including decreased rates of surgical complications and improved recovery with reduced postoperative pain and shorter hospital stay. For these reasons, Laparoscopic Hysterectomy (LH) is considered the gold standard surgical option for the treatment of both benign gynecological conditions and early-stage endometrial cancer (1,2).

Over last 5 years, Te Whatu Ora Counties Manukau Gynecology service have offered LH as standard of care. Over this time, we have observed surgical training to be a significant barrier to increasing LH numbers. There are multiple programs throughout Australia and New Zealand available to trainees who are want further training in advanced laparoscopic surgery. However, no current training program exists for Fellows of the Royal Australian and New Zealand College of Obstetrics and Gynecology (RANZCOG) motivated to upskill in LH.

To address this, our service has developed a structured, Consultant focused LH training program (SCLHT) supporting Senior Consultants experienced in traditional abdominal and vaginal approaches



but completed training prior to paradigm shift towards minimal access surgery. Our aim is to present and evaluate this project by examining the primary outcome of 50% increase in the proportion of LH performed by clinicians after program completion. With additional secondary objectives to again observe an increase in the proportion of LH at our unit, Counties Manukau, with comparison to other units throughout New Zealand that also offer LH.

**Key words:** Laparoscopy, Hysterectomy, Upskilling, Preceptor, Trainee

## Literature review

Review of the current literature supports the rationale for specific LH training programs for Consultant Obstetrics and Gynecology (O&G) Specialists. An article published by Janda et al (2018) (3) surveyed Australia and New Zealand O&G Specialists and found the main barrier to increasing LH rates being a lack of available structured training and mentoring opportunities to gain the necessary surgical skills (3). In response, Obermair et al (2019) presented a protocol and surgical outreach training model. This protocol proposes a stepped wedge implementation trial and has yet to be evaluated (4).

International evidence shows that structured education and training programs for O&G specialists are effective in increasing the rate of LH. A Finnish study, Makinen et al (2013), demonstrated a reduction in abdominal hysterectomy rates from 58% to 24% and respectively, a significant decrease in associated post-operative complication rates (5,6). A Canadian study, Geoffrey et al (2016) after implementing a program for Attending Gynecologist from two hospitals with a preceptorship model of training, demonstrated an increase in LH from 40% to 74% (7).

Following literature review, it is clear this project provides an opportunity to contribute to current literature.

## Methods

### Program description

Our program is based on a surgical preceptor and trainee model and developed based on current Australasian Gynecological Endoscopy and Surgery society (AGES) trainee LH Assessment of Procedural

Skills (APS) form (procedure specific) and the International Society of Gynaecologic Endoscopy (ISGE) Accreditation in Endoscopy Guideline (for general laparoscopic procedures considering case complexity) (8,9). Together these guidelines provide a framework supporting a reproducible programme allowing for clear and objective documentation of progress, evaluation, assessment of competency and ultimately credentialing.

Senior Consultants, Fellows of the Royal Australian and New Zealand College of Obstetrics and Gynecology (RANZCOG), experienced in general laparoscopic surgical procedures (RANZCOG laparoscopy level 3) (10), motivated to develop surgical skills required for LH initiate the process by submitting a written request to the Clinical Director. Once accepted, participant requirements include attending an advanced cadaveric laparoscopic training course, reviewing videos of a LH via web-based learning module and regular use of a laparoscopic box trainer to practice laparoscopic specific surgical skills such as suturing and knot tying.

Preceptors are required to be experienced in both abdominal and LH, be committed to provide the necessary support to the trainee, complete the surgical skills assessments after every case and give constructive feedback.

Trainee assessments include a baseline assessment completed by the surgical preceptor, completion of the AGES LH Assessment of Procedural Skills (APS) form (8) after each LH and a 360-degree feedback form (communication, responsibility, and leadership skills). Preceptor and trainee operate together until the trainee can safely perform a LH independently with minimal input for the preceptor (approximately 15 procedures). Both Clinical

Director and preceptor, sign off the trainee off marking completion of the SCLHT program and awarding official LH credentialing.

Since start of the project in 2017, with one clinician at any one time, five senior consultants have completed the 6–12-month training and credentialed, with one consultant currently undertaking the program.

### Program evaluation

We conducted a retrospective descriptive study to evaluate the impact this project has had on the proportion of LH. Data was collected from clinical coding including absolute Hysterectomy numbers and breakdown of route (laparoscopy, Abdominal, Vaginal) for both individual clinicians who have completed the SCLHT programme and Counties Manukau as a collective unit for the last five years (2017-2021). We then invited other units throughout New Zealand to be part of our project and provided their unit's Hysterectomy data.

Our study's primary outcome measure is a 'clinician response rate' defined as the proportion of clinicians after with a relative increase in LH greater than 50% after SCLHT programme completion and preformed a Wilson analysis. With additional secondary objectives to again observe an increase in the proportion of LH at Counties Manukau, with comparison to other units throughout New Zealand also offer LH.

No Health and Disability Ethics Committee approval was required for this study.

### Results

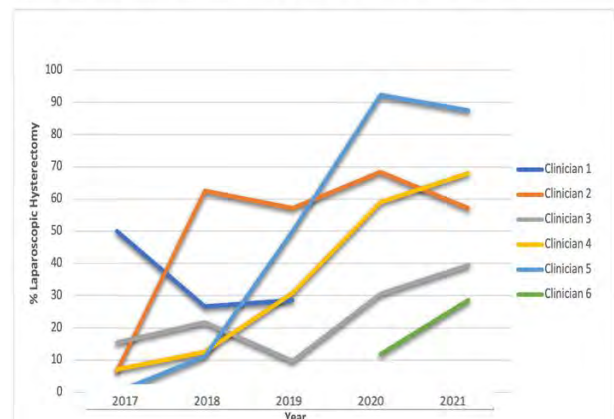
Te Whatu Ora Counties Manukau is an urban tertiary academic public hospital serving South East Auckland, New Zealand. It is the fastest growing catchment area serving a multi-ethnic population and disproportionately high socioeconomic deprivation with large Maaori and Pacifica communities. Our Women's health service consists of 33 Consultant Obstetrician and Gynaecologists, 13 Specialists trained in LH, three of which are preceptors and an additional five clinicians completing the SCLHT programme.

### Statistical analysis

#### *Primary outcome*

The study's primary outcome measure is a 'clinician response rate' defined as the proportion of clinicians after with a relative increase in Laparoscopic Hysterectomy greater than 50% after SCLHT programme completion. Analysis of the data indicates a clinician response rate of 100% (Wilson 95%CI 37.6%; 96.4%). All four clinicians (clinician two to five) included in the statistical analysis demonstrated significant increase in their proportion of Laparoscopic Hysterectomy/Total Hysterectomy (Figure 1). It is important to note, clinician one and six were not included in the statistical analysis and clinician one, the first to complete the course no longer works with our service and provides an explanation to why this individual has not performed any procedures after 2019. Clinician six is currently undertaking the SCLHT programme and started in 2020.

Figure 1. Proportion of Laparoscopic Hysterectomy by clinician at Counties Manukau (2017-2021).



#### *Secondary objectives*

The study's secondary objectives were to first demonstrate how the SCLHT programme has influenced LH rates by observing an increase in the proportion of Laparoscopic Hysterectomy/Total Hysterectomy at Counties Manukau 2017-2021 (Figure 2). As shown LH has dramatically increased over the last five years from 24.2% to 53.3%, a 120.2% percentage increase and is inversely proportional to Abdominal Hysterectomy rates. Interestingly, vaginal hysterectomy numbers have remained stable and clearly not compromised by an

increase in laparoscopic procedures. A possible reason for this finding is the majority of Vaginal Hysterectomies are now performed in the context of pelvic organ prolapse by a small number (only three at Counties Manukau) of Consultants with a Urogynaecology special interest.

Table 1. Indicates that the rate of Total Hysterectomy performed at Counties Manukau are steadily increasing. It is important to note the COVID-9 pandemic has significantly affected elective operations and provides a justification to why there was a small reduction rather than an increase in the number of Hysterectomies performed 2020-2021. But surprisingly did not affect the proportion of LH performed over this period.

Figure 2. Hysterectomy by route (Laparoscopic, Abdominal, Vaginal) at Counties Manukau (2017-2021).

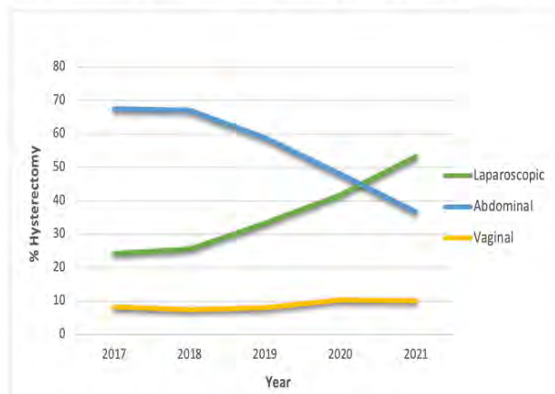


Table 1. Total number of Hysterectomy at Counties Manukau (2017-2021).

	2017	2018	2019	2020	2021	TOTAL
Hysterectomy	281	243	306	349	330	1509

Next, we compared our Counties Manukau data to other units throughout New Zealand also offering Laparoscopic Hysterectomy, Northland, Auckland, Waikato, Bay of Plenty and Capital and Coast (Figure 3). As presented in Figure 3. Majority of the comparison units have also gradually increased their proportion of Laparoscopic Hysterectomy / Total Hysterectomy. It is Important to note these units do not have an established structured training programme but surgical mentoring does occur on a more ad hoc and informal basis. As confirmed by

Figures 2 and 4. Counties Manukau along with all other units of comparison have steadily increased the proportion of Laparoscopic Hysterectomy/Total Hysterectomy with Counties Manukau again demonstrating the most significant percentage increase 120.2% (24.2% to 53.3%) vs 43.0% (36.7% to 52%).

Figure 3: Comparison of Counties Manukau to other units offering Laparoscopic Hysterectomy (2017-2021) - Northland, Auckland, Waikato, Bay of Plenty and Capital and Coast

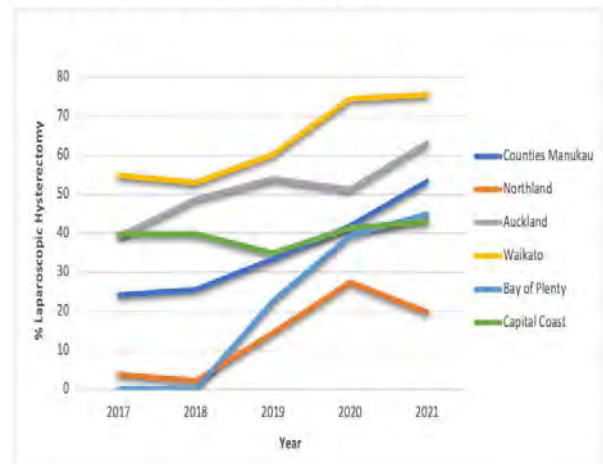
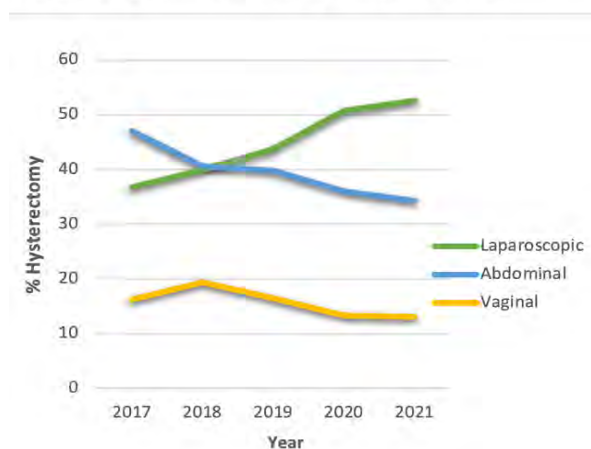


Figure 4. Hysterectomy by route (Laparoscopic, Abdominal, Vaginal) for all other comparison units (2017-2021).



## Discussion

Our project supports the rationale for a LH training programs for Consultant O&G Specialists. Analysis of the data indicates that this SCLHT program is effective in increasing proportion of LH not only for clinicians individually, with all participating clinicians achieving a >50% increase in the proportion of LH, but also as a collective unit, when compared to other units throughout New Zealand.

Counties Manukau LH rates have dramatically increase from 24.2% to 53.3%, a 120.2% percentage increase since implementation of the SCLHT program.

The Counties Manukau Gynaecology unit serves a population with disproportionately high rates of obesity and obesity related endometrial cancer predominantly among Maaori and Pacifica communities. Women with higher BMI stand to gain the greatest differential benefit from a laparoscopic procedure given the alternative laparotomy is associated with higher rates of wound complications (infection and dehiscence) and sepsis particularly in the context of obesity. A service flexible enough to evolve and meet the needs of the community it serves is a fundamental value held by our Women's health service and is the driving force behind the development of the SCLHT programme.

In addition to complexity associated with obesity, the population we serve have high rates of pelvic infection at its complications particularly tubo-ovarian abscess (TOA), endometriosis, multifibroid uterus and previous abdominal surgery (including caesarean sections) acting as potential confounding factors. Despite this, the service has steadily increased the proportion of LH and we believe this is reflective of a high level of surgical skills, training, and experience within the unit.

Inherent to improving patient outcomes, comes a commitment by all medical professionals to lifelong learning and professional development. Despite this, the preceptor/trainee relationship sometimes presented a challenge as consultant and trainee, are colleagues and often more senior in terms of experience than their preceptor counterparts. This model of training required a different approach to the traditional consultant/trainee - registrar relationship and called for a level of diplomacy.

It is important to mention, the COVID-9 pandemic has significantly affected the delivery of elective health care services. Particularly so at Counties Manukau, South East Auckland was the hardest hit region with the highest admission rates and COVID-19 related deaths in New Zealand. Due the disruption to elective operations, you would assume negatively affected Hysterectomy numbers

but surprising this fact did not influence the proportion of Laparoscopic Hysterectomy performed over this period (2020-2021).

We believe the strengths of this study are that the SCLHT program provides a surgical preceptor and trainee model that is well described, effective, reproducible, scalable also transferable to other units and to other surgical procedures. Our project is limited by the retrospective study design and practicalities associated with only one unit with low absolute numbers and small sample size.

## Conclusion

Our structured, Consultant focused LH training programme provides a surgical preceptor and trainee model that is well described, effective, reproducible, scalable also transferable to other units and to other surgical procedures. It has also proven to be effective by significantly increasing the proportion of LH for both individual clinicians and as a collective service.

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## Ultrasound features of uterosacral ligaments on transvaginal scanning

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### Abstract

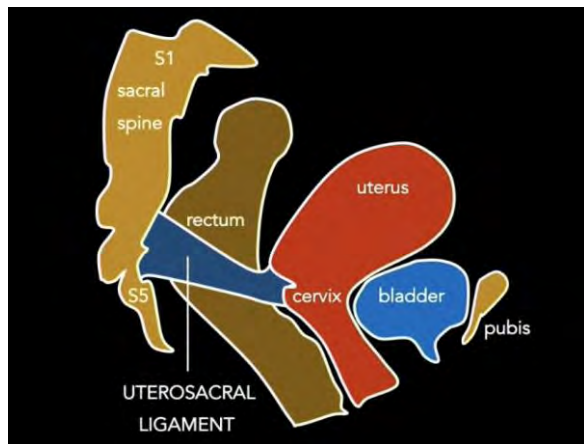
The paired uterosacral ligaments, important supporting structures of the uterus and the apical vagina, have been reported to be the most common side of deep endometriosis in pelvis. On transvaginal ultrasounds, they appear as hyperechoic stripes starting from the cervix with a semi-horizontal direction. A lesion is suspected when their regular or irregular hypoechoic thickening is visualized. This paper presents the ultrasound technique used in the author's institution for the detection and analysis of the uterosacral ligaments. Knowing their location and ultrasound morphology can increase the detection rate of endometriosis and other lesions affecting the uterosacral ligaments.

**Key words:** endometriosis, rectouterine ligaments, sacrouterine ligaments, ultrasound, uterosacral ligaments.

### Introduction:



The paired uterosacral ligaments (USL), sometimes called the sacrouterine or rectouterine ligaments, are important supporting structures of the uterus and the apical vagina (1, 2). They extend posteriorly from the uterine cervix, define lateral boundaries of the rectouterine and rectovaginal spaces, and attach to the sacral spine indirectly, via the presacral fascia (1, 3), as schematically presented in Figure 1. However, there is conflicting information in the literature regarding the exact location of the USL insertion points at the pelvic wall, as previously summarized by Donaldson *et al.* (1).



**Figure 1.** Schematic representation of the right USL in the female pelvis (adapted from Donaldson *et al.* 2021, (1))

Being composed of collagen, smooth muscle, autonomic nerves, blood vessels and lymphatic channels, the USLs are distinct from fibrous joint ligaments (4). They can be divided into three sections: distal cervical section (mainly comprised of smooth muscle), intermediate, and proximal sacral section (made predominately of

looser connective tissue) (1, 3, 4). The inadequate use of the term "ligament" reflects the still insufficient knowledge of this important anatomical structure.

Weakened or damaged, the USL plays a significant role in the pathophysiology of pelvic organ prolapse (2). Besides, they can be affected by malignancy, especially by locally spreading cervical cancer (5). The USLs have been also reported to be the most common side of deep endometriosis (DE) in pelvis (6).

Over the past decades, various imaging techniques have been advocated for non-invasive (non-surgical) visualization of pelvic endometriosis to shorten the well-documented delay in the diagnosis (7). It has become widely accepted that transvaginal ultrasound (TVUS) can reliably diagnose DE in pelvic structures (8). Contrary to the long-standing belief that the USLs can be only seen on TVUS if they bear a lesion or if there is a fluid in the pouch of Douglas, the sonographic visualization of normal USL (the proximal section) is possible (9). This article aims to present the technique used at the author's institution for the detection of the USLs.

### Material and Method:

For this demonstration, a female volunteer of reproductive age was selected, in whom normal USLs were observed by TVUS. Subsequently, a patient diagnosed in our Gynecological Ultrasound Unit with a DE lesion of the USL, who

accepted to participate in the project, was included for comparison. Scanning was performed in both cases using an Aplio i700

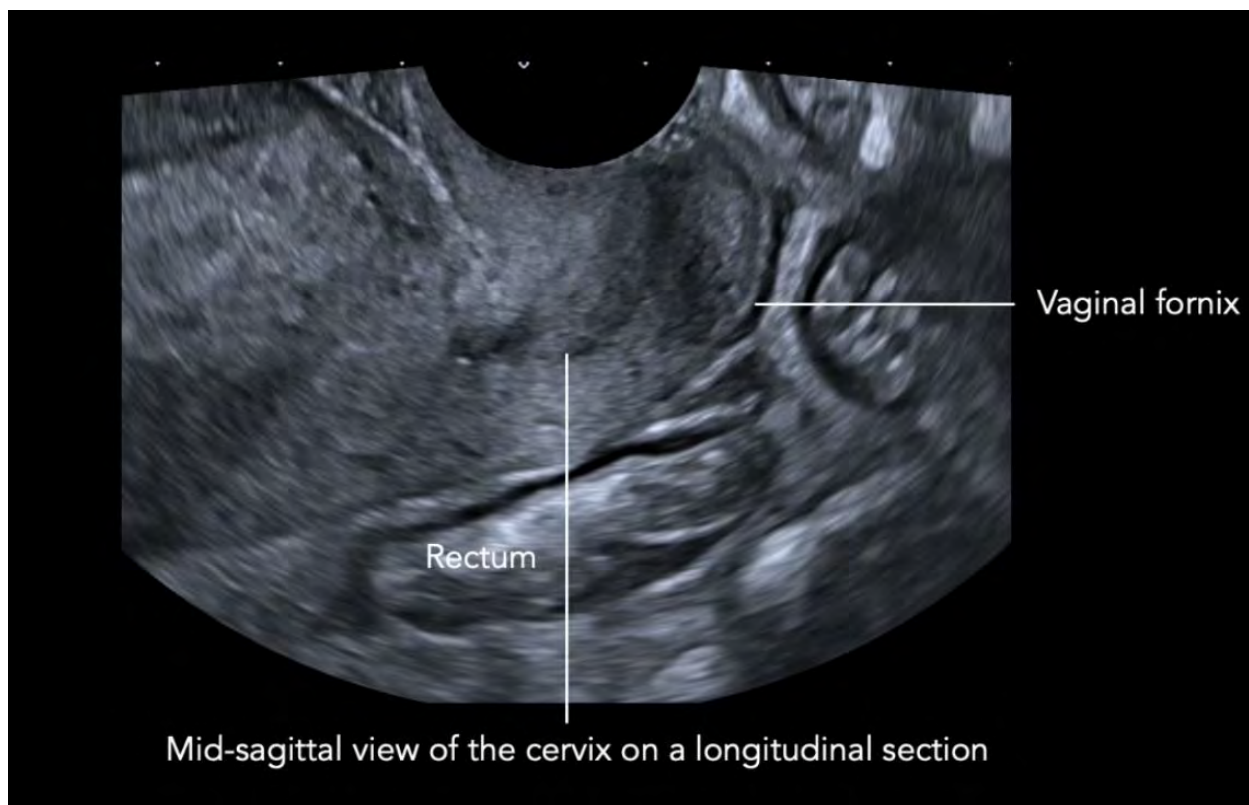
ultrasound machine (Canon Medical Systems Ltd).

## Results:

### *TVUS technique to identify and analyze the USLs*

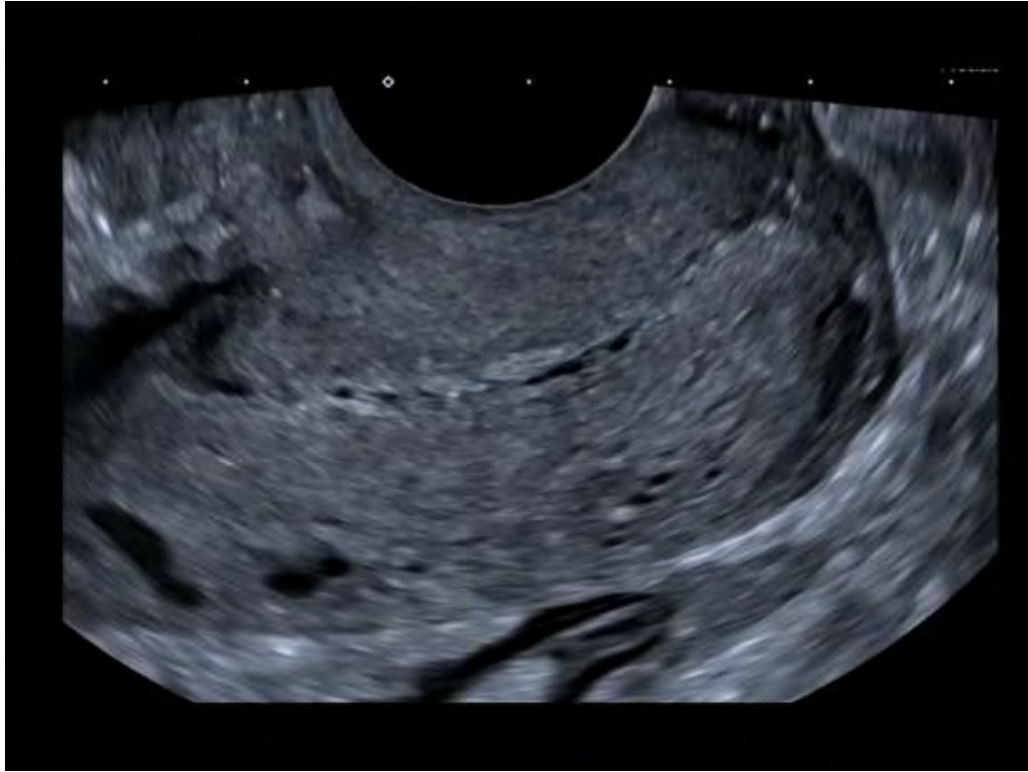
To visualize and analyze the USLs, according to our technique, the following steps are performed:

1. The TVUS probe is inserted into the anterior vaginal fornix to reach a mid-sagittal view of the cervix on a longitudinal section (Figure 2).



**Figure 2:** TVUS technique for the detection and analysis of the USLs: placement of the TVUS probe in the anterior vaginal fornix

2. The penetration depth is adjusted so that the cervix fills 2/3 of the screen (Figure 3).



**Figure 3:** TVUS technique for the detection and analysis of the USLs: adjustment of the penetration depth (cervix fills 2/3 of the screen)

3. In order to obtain a transvers section of the cervix, the probe is rotated for 90°. (Figure 4).



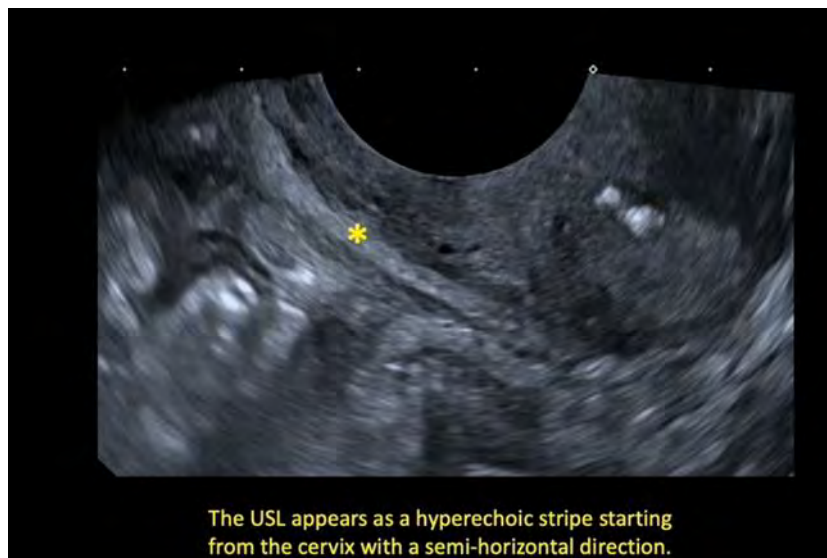
**Figure 4.** TVUS technique for the detection and analysis of the USLs: the TVUS probe 90° rotation

4. Then, the probe is directed laterally (and slightly posteriorly) until the hypoechoic structures representing uterine vessels are visualized (Figure 5).



**Figure 5:** TVUS technique for the detection and analysis of the USLs: the TVUS probe lateral pointing (visualization of the left USL)

5. The USL appears posteriorly to the uterine vessels, as a hyperechoic stripe starting from the cervix with a semi-horizontal direction (Figure 6).

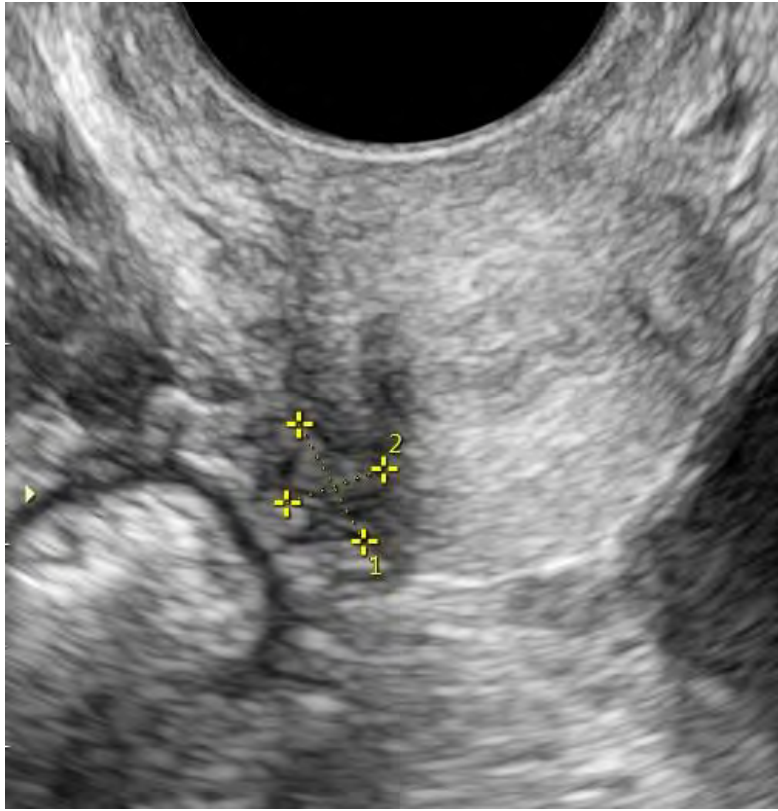


**Figure 6:** TVUS technique for the detection and analysis of the USLs: the same maneuver presented in Figure 5 performed on the contralateral side (visualization of the right USL)

6. The probe can be rotate by a few degrees in order to visualize the US on a longitudinal section.



7. The same maneuver is performed on contralateral side to identify the contralateral USL (Figure 7).



**Figure 7:** TVUS showing an endometriotic lesion affecting right USL

Normal USLs are homogenous and hyperechoic (Figures 5 and 6). While the medial portion of the USLs can be easily identified during TVUS, the most lateral portion fades into the presacral fascia, to be inserted via this fascia into the sacrum. On their way, USLs pass medially to the ureters and laterally to the rectum.

A DE lesion appears as a regular or irregular, generally hypoechoic thickening/nodules within the hyperechoic USL (Figure 7). Site-specific tenderness of the USLs should be examined and documented, independently if a lesion is observed or not (10, 11). Observed lesions compatible with DE should be measured in three

orthogonal planes (10, 11). The USL DE nodule can be classified as: type 0 - confined to the USL (no infiltration into parametrium or torus uterinus); type 1P - partially infiltrating parametrium (>50% of DE nodule within USL); type 1T - partially infiltrating torus uterinus (>50% of DE nodule within USL); type 2P - significantly infiltrating parametrium (<50% of DE nodule within USL); type 2T - significantly infiltrating torus uterinus (<50% of DE nodule within USL) (9). The evaluation of the ureters should be done in the patients with the USL/parametrial nodules, as well as in all patients with suspected or known endometriosis.

Superficial USL endometriotic lesions (usually small, only a few millimeters in diameter) can be visualized if there is endogenous intraperitoneal fluid (6). They also can be visualized by saline sonoPODography, as previously described (12).

### **Discussion:**

This article demonstrates that it is possible to visualize normal and uterosacral ligaments affected by endometriotic lesions using TVUS. They should be systematically examined. Chapron *et al.* observed USL DE in 69.2% of patients with DE (13). Reidet *et al.* reported that in women with endometriosis who underwent laparoscopy, 35% had isolated superficial endometriosis, while 33% had DE (14).

The International Deep Endometriosis Analysis Group (IDEA) proposed a systematic approach to sonographic evaluation of the pelvis in women with suspected endometriosis (10). The International Society for Gynecologic Endoscopy (ISGE) established the recommendations for structured reporting of dynamic ultrasound findings, promoting the practice of standardized, comprehensive and systematic evaluation and

On TVUS, the paired USLs appear as hyperechoic stripes starting from the cervix with a semi-horizontal direction. If a regular or irregular, generally hypoechoic thickening is visualized, a lesion is suspected. The knowledge of the USL location and ultrasound morphology may

reporting of pelvic endometriosis (11). In addition to the technique presented here, other ultrasound approaches for visualization and assessment of USL have been published (6, 9). Further studies are needed to show whether the different techniques have comparable accuracy.

In a prospective international pilot study, Leonardi *et al.* evaluated the diagnostic accuracy of transvaginal ultrasound for the detection of endometriosis using the IDEA approach (15). The overall performance of TVUS for DE, based on surgical visualization as the reference standard, was as follows: accuracy 86.1%, sensitivity 88.4%, and specificity 78.8%. However, for right/left USL DE, TVUS accuracy was 65.2%/72.2%, sensitivity 49.2%/58.7%, and specificity 77.8%/83.7%. Thus, the IDEA consensus methodology provides strong diagnostic accuracy for TVUS assessment of DE overall, but efforts should be made to improve USL DE detection rates. This can be achieved through operator training. The technique presented here could be useful, as it demystifies the USL visualization and analysis in a relatively simple and straightforward way.

### **Conclusion:**

increase the detection rate of (endometriotic) lesions affecting these structures.

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## Minimally invasive surgery in countries with low economic resources; obstacles to development and solutions for the future.

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### Abstract

Minimally invasive surgery has become the reference technique in several surgical specialties. Its penetration rate however remains low in countries with low economic resources. The causes of this deficiency are multifactorial. Economic causes and difficulties of access to specialized practical training represent the major obstacles to the development of this surgery. These failings are compounded by cultural prejudices and the lack of political will. To remedy this situation, health actors in these countries must innovate to facilitate learning and practice of minimally invasive surgery in low-resource environments. New technologies and communication tools can be of great help in bridging the economic gap. The adequate and appropriate use of local human and economic resources seems to be the key to success. In the long term, we will have to redefine a new custom made minimally invasive surgery adapted for situations with low human and economic resources.

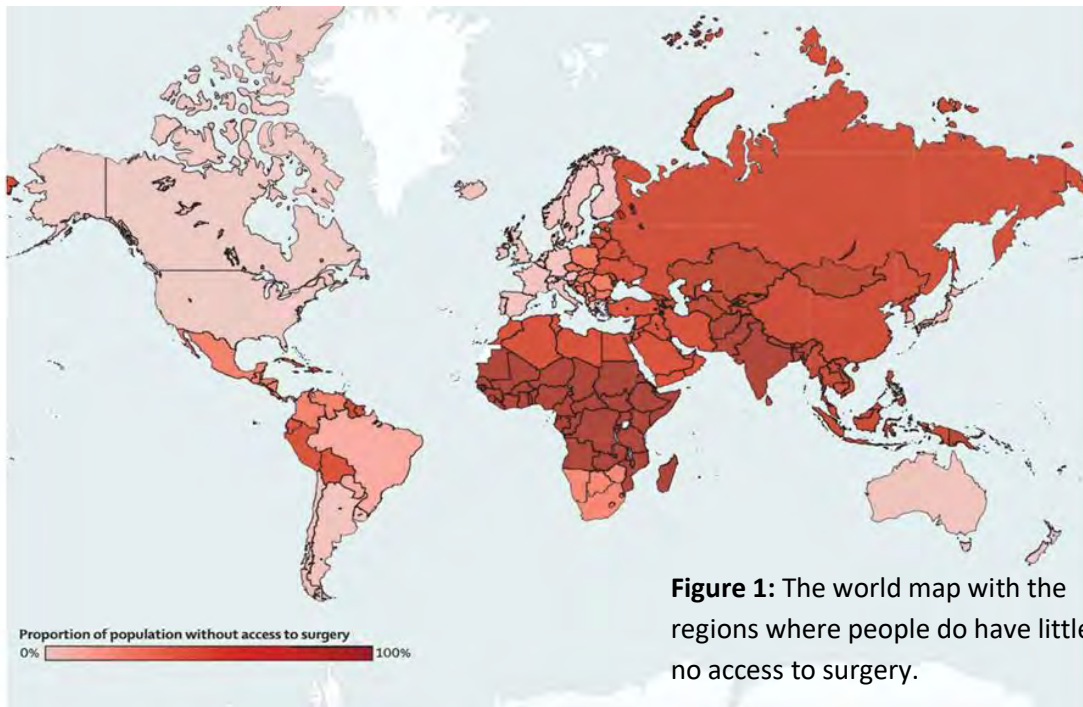
**Keywords:** Minimally Invasive Surgery (MIS), Laparoscopy, Low-resource settings, Low-Income countries (LICs), Lower Middle-Income countries (LMICs), High-Income Countries (HICs)

## Introduction:

Surgical care plays a pivotal part in the health service. This universal right however is not available for everybody. In fact, in the Low-Income Countries (LICs) patients do suffer from the difficulty to access surgical care. On estimate, two third of the world population do not have access to reliable surgical care and two milliards of people do not have the possibility to receive surgical care. The latter is due to the lack of financial means and or human resources. This leads to the constatation that every year this limited access to surgical care kills nearly seventeen million human beings. This number exceeds the deaths caused by HIV/AIDS, tuberculosis and malaria combined (1-2) (Fig 1).

The High-Income Countries (HICs) do have better quality indicators and social security provisions. These do induce an increase of the cost for the social security. The increase of the costs of the social security in these countries grows more rapidly than their economy. This will necessitate a cut in the social security expenses to guarantee the quality of the social security in the future.

Minimal invasive surgery (MIS) has thrown a new light on classical surgery and did point to an evolution in the history of surgery. MIS does offer a magnified anatomy leading to better diagnosis and more accurate surgical gestures. MIS does allow for an efficacious treatment with a secured outcome respecting to the maximum the different organs and their function. The



**Figure 1:** The world map with the regions where people do have little or no access to surgery.

The economic inequalities of our planet reflect themselves manifestly in the health systems as 60 % of surgeries are realized for only 16% of the world population and only for 6% for the LIC's population on the other hand, while one third of the world's population lives in these countries. (3).

reduction in trauma to the abdominal wall and the peritoneum is associated with a lesser immediate postoperative discomfort; shorter hospital stays and shorter postoperative revalidation. The publication of these techniques by the pioneer units in the 1980-ties have led to the general application in a great number of interventions in several surgical specialties and

have been adopted by most of the hospital units (4).

The technique has been largely adopted in the HICs. The situation is very much different in the LICs and Lower- Middle Income Countries (LMICs) countries. Its advantages do not have to be demonstrated in these countries where the hope is that these techniques will make it possible for more patients to have access to surgery. The aim of this revue is to make the point of the situation of MIS in the developing countries, to expose the obstacles of its development and to propose solutions for the future.

#### Actual status of surgery in the world.

Despite the efforts deployed a large part of the world population remains having difficulties to access to quality medical treatment and therefore does, in concreto, not have access to the right on health services. Very important disparities still do exist between countries of the north and the south and between cities and rural communities (5).

According to the Lancet Commission on Global Surgery, at least 4,8 milliards of the global populations does not have timely access to reliable surgery (Fig 2). It is the poorest countries that encounter most difficulties to access to general treatment and especially to surgical treatment. On the one hand, more than 95% of the population in South Asia and in African Central Sub-Saharan both east and west do not have access to treatment whereas on the other hand only 5 % of the population of Australia, North America and Europe do not have access to treatment (6). The estimate is that in countries with low or intermediate income, nine out of ten people do not have access to basic surgical treatment and that 143 million of supplementary surgical interventions are necessary every year to



Figure: 2 G4 Indicating the surgical conditions and the number of deaths caused.

prevent disability (7). Costs of surgery and anesthesia are at the origin of “catastrophic” expenses for some 33 million of people (8). The problem being essentially the burden of the direct costs concerning surgical treatment (9). Peri operative mortality is as high as 5 to 10% in the LICs versus 0,4 – 0,8% in the HICs, the majority due to infections, complications of anesthesia and per- or post-operative bleeding problems. The non-availability of equipment, infrastructure, medication and balanced organization are at the origin of these deficiencies (10). The HICs do have excellent indicators of quality and social security available, this is correlated with the high cost of health services and social security in these countries (11). The increase of the costs for health and social security in these countries is growing more rapidly than their economies. As an example, in the United States the costs for health and social security have risen rapidly and represent 17% of the Bruto National Product (BNP) (12). The consequences are that all over the world and more particularly in the LICs there is a need to reflect on ways to simplify the surgical care and make the latter more cost effective.

Actual Status of the Minimal Invasive Surgery (MIS) in the world

MIS in the developed countries:

In almost all surgical specialties MIS has become mainstream over the last 20-30 years (13 -14). MIS has replaced conventional surgery for many indications. The reason being that MIS allows for reduction in patients discomfort, morbidity, reduction in prevalence of adhesions and also reduces hospital stay and enhances and shortens recovery for the patients (15-16). According to the American College of Surgeons (ACS), the use of laparoscopy is still increasing over the observed period of time from 22,7% in 2005 to 49,8% in 2014 (17). In Switzerland, a national study from 1998 to 2017 reveals that half of the colorectal resections have been realized by MIS in 2016 while cholecystectomies have been operated only by laparoscopy since 1998 (18). Less than one decade after the introduction of

the laparoscopic technique, 500.000 to 600.000 cholecystectomies have been performed by laparoscopy in the United States only (19). Introduced by gynecology and still largely used in this specialty, laparoscopy is now used in digestive surgery (bariatric, gastrointestinal, colorectal and hepatic surgery) and in urology although technique covers just one aspect of MIS.

In its seventh report, Global Industry Analysts estimates that the global market in MIS has a value of 49 milliard of US Dollars in 2020 and will grow to 90,4 milliard US Dollars in 2027, meaning an annual growth of 9,1% in the period from 2020 to 2027. In the United States, the market of MIS was estimated to be 14,5 milliards US Dollars in 2020. In China, the second economy in the world, it is estimated that the MIS market will rise to 15,6 milliards US Dollars in 2027 powered by a yearly increase of 8,5 % up to 2027. Other

remarkable geographical markets are Japan and Canada here the MIS markets will increase respectively of 8,7% and 7,3 % in the period from 2020 – 2027 (20).

MIS in the LICs:

The proven advantages of laparoscopy over “open air” surgery is even more important in the emerging countries especially in view of the number of hospital beds, the scarcity of blood banks and the non-availability of modern imaging techniques (21). The technique in fact is perfectly adapted for use in the emerging countries as hospital stay is decreased and the return to normal activity for the patients is enhanced, factors that reduce the overhead costs for surgery. A major obstacle for the adoption of the technique in emerging countries is the non-existing official data and publications (22). Nevertheless, the few data available and published on the numbers of laparoscopic surgeries for gynecologic indications show that the numbers are very low and vary extremely from one hospital to the other (23). Published data in the large reference hospitals in different countries show that the prevalence of laparoscopic surgery for gynecologic indications remains under 10% (24). Furthermore, the use of laparoscopic techniques remains basic and in a series of centers restricted to only diagnostic procedures. The conclusion has to be that the adoption and the use of MIS in the emerging countries remains poor and that compared with “open air” surgery and only less complicated procedures are performed. (22).

Obstacles to the adoption of MIS:

The obstacles preventing the diffusion and adoption of MIS are multifactorial with as most important insufficient investments in surgical material and very specifically the sparsity of and difficulty to find specialized courses allowing to

be trained in the technique (25). The sparsity of economic resources is the principal obstacle. The weak economic situation does not allow for the buying of endoscopic equipment nor the maintenance of the latter and the specific training of surgeons and technicians that would allow them to perform endoscopic procedures. The above explains why the use of endoscopy is mainly reduced to diagnostic procedures in the emerging countries (26). There is a direct relation between the bruto national product of a country on the one hand and the percentage of the complex MIS surgeries done on the other (25).

The relatively small number of surgeons in the LICs prevents them to subspecialize and this results in MIS being time consuming entities, mostly at the beginning, with potentially more complications that most of those surgeons are not able to handle (27). This creates an auto inhibitive effect causing the learning curve to become much longer. Furthermore, the surgeons and theatre personnel, well formed in MIS, are not always available. (28-29). The climate of limited resources in the LICs also hinders the training in laparoscopic skills due to the lack of experts willing to teach. Moreover, as soon as these experts are able to, they leave the university hospitals for more lucrative businesses. Another factor to deal with is the fact that the laparoscopic technique is not toughed in the third cycle of medical school in several LICs. The main reason being the lack of resources and therefore the teaching labs and simulation labs are difficult to find as the equipment is costly (30). This lack of training of the surgeons becomes apparent in the rate of conversion to laparotomy in the emerging countries as well as in a higher percentage of major complications and finally in longer operating times. (31-32-33) From the opinion of decision makers, surgery is traditionally evaluated to be complex and expensive. Surgery has never been included in

the category of primary care although surgical interventions have proven to be of value in saving lives and preventing disabilities (34-35). Sometimes decision makers are hesitant and lack the will to take initiatives allowing for new perspectives as the adoption of the MIS in daily practice. Even more, some decision makers make statements declaring that MIS does not suit emerging countries due to the fact of the costs not only for the material but also for the training of the doctors and the necessity of a technical platform adapted to this form of surgery. Often “open air” surgery is considered to be more reliable in low resources environments (36). The last but not least obstacle is formed by sociocultural barriers as the older surgeons do resist changes (24). Some of these senior surgeons do represent a barrier to the development of MIS. In fact, they have more possibilities to be trained in MIS than their junior counterparts but they do not integrate MIS in their daily practice. They are suspicious towards new techniques and are not able to see the advantages of MIS due to a lack of information and appropriate training in MIS (37). All the above factors are aggravated by a bad management of the few available resources, financial and human, and the absence of a global vision on health and social security. The latter due to not knowing the actual health situation and the absence of objectives on the short and long term.

## **V Advantages of MIS in the emerging countries**

Adapting MIS in emerging countries enables to generate several beneficial effects first clinical, but also economical and on a broader scale a positive impact on the social security and health situation.

### 1. Clinical advantages

- o Reduced hospital stays

- o Smaller abdominal scars and hence reduced risks on infections
- o Less long-term complications such as eventrations and adhesions
- o When there is a limitation in available imaging techniques, laparoscopy can reduce the number of unnecessary laparotomies and can be helpful in detecting pathologies like tuberculosis, intra-abdominal cancers, pelvic inflammatory disease and abdomino-pelvic traumata (34).

## 2. Economic advantages

The adoption of MIS and laparoscopy in particular could be beneficial for the hospitals as compared with “open air” surgery

- o Minimal use of analgesics, antibiotics, bandages and other medical appliances (38).
- o Shorter hospital stays (39 -40)
- o Speedy return to the workplace. This is especially important in view of the impaired socio-economic conditions.

## 3. Structural advantages for the health system and social security

In adopting MIS, more hospital beds will be available due to the more rapid discharge of the patients and this entails that the waiting time for surgeries can be reduced (41). Furthermore, laparoscopic schooling will give the surgeons a

feeling of professional accomplishment and will give them motivation that in turn will inspire the patients to have confidence in the health system (42).

## **VI Future perspectives**

Developing surgery and in particular MIS is imperative for emerging countries. In fact, 28% - 32% of the world's morbidity can be brought back to pathologies that can be treated by surgery. It is also estimated that there will be an annual decrease of 2 % in BNP for the LMICs up to 2030 due to a shortage of surgery (43).

Surgeons will be called to play a primordial role in the orientations of the health politics in their respective countries as to guarantee reliable and universal treatments. The medicine and the surgery in the emerging countries at this moment in time are based on data coming in majority form HICs and adapted to the HICs economic, social and human conditions. This kind of medicine cannot just be transplanted in LMICs and LICs environments without being adapted before application.

The primordial role of the decision-making doctors in the emerging countries is to adapt—based on facts - this medicine, before application in their respective countries, to their own human and economic conditions without sacrifice nor security nor efficacy. This compromise between means and results is not easy but above all necessary. It requires from the medical decision makers an effort in innovation that at the moment is cruelly absent in these countries (22).

## **Adaptation of MIS in emerging countries**

The adaptation requires a perfect knowledge of the actual data concerning the present practice of medicine and a thorough knowledge of the local economic, social and human conditions. The aim is to address both the technical part of

care and the training of both doctors, paramedical personnel and technicians.

The specialized surgical techniques have to be reduced at their simplest form and made available to every surgeon, not time consuming, reliable with a reduced potential of complications and able to be performed with a minimum of instrumentation. The potential danger of a complication depends largely on the theatre environment where it arises. An ileostomy is easy to handle in a HICs but is potentially deadly in a LICs or LMICs.

Locoregional anesthesia should be used whenever possible especially in ambulatory surgery (44).

Preference should be given to reusable, easy to take apart and reassemble instruments. It is advisable for these instruments to be fabricated by local craftsmen and factories as this guarantees availability and stimulates local economy.

Surgical training has to be locally organized with the instrumentation locally used and under the same working conditions. Courses in the HICs with sophisticated instrumentations and expert techniques give rise to surgeons who will be torn between their rightful surgical ambitions and the local deceiving circumstances.

#### Adaptations described in literature contain:

- o Gasless laparoscopy can be obtained by using towel clamps or pieces of thread to bring tension on the abdominal wall using a laparolift, a laparofan or power activator and abdominal retractor (45).
- o Constructing alternatives for endobags using low-cost condoms, packaging of

nasogastric tubing's or gloves (46 – 47 - 48).

- o The use of reusable trocars and instruments using a sterilization procedure, the use of drapes and tubes that can be washed and autoclaved. These instruments have a live span of up to 18 years and allow for an economy of up to \$ 300 per surgery. (49-50-51-52)
- o Use the sun as light source (53).
- o Use simple instruments to skeletonise structures (49).
- o Use ovum forceps to make a stone remover (49).
- o Use a cystoscope as a laparoscope (50).
- o Replace a harmonic scalpel with bipolar forceps's (54).
- o Make tripolar forceps with a knife in between the bipolar forceps (54).

#### Innovation in the emerging countries

New communication tools are all over. According to the providers there are more mobile phone contracts that living human beings on earth. Health services have not been spared by the association between medicine and communication tools. This combination is the bases of a new concept within the health services. This combination is within reach of emerging countries in so far that it could, even partially, reduce the sparsity of care and reduce the costs of the health systems and social security in HICs. This kind of medicine is only starting but the first results are promising. It seems without doubt that these forms of medicine will, in the long term, replace actual



forms of medicine. Emerging countries have to adapt, secure and generalise these forms as to reduce the costs of the health system.

#### Preoperative application:

Several digital medical applications available on smartphone allow for an easier diagnostic and interpretation of the clinical exam in several specialties.

The haemodynamic parameters can be assessed by these applications. OpitBP allows for the measurement of the blood pressure and is comparable with a pressure meter (55). The Electro Cardiogram can be realised by watches connected to a smartphone (56). The same goes for some biological analysis like oxygen saturation and level of hemoglobin (57 -58). These innovations have a great impact on emerging countries where screening and routine exams are not accessible for the whole of the population (59)

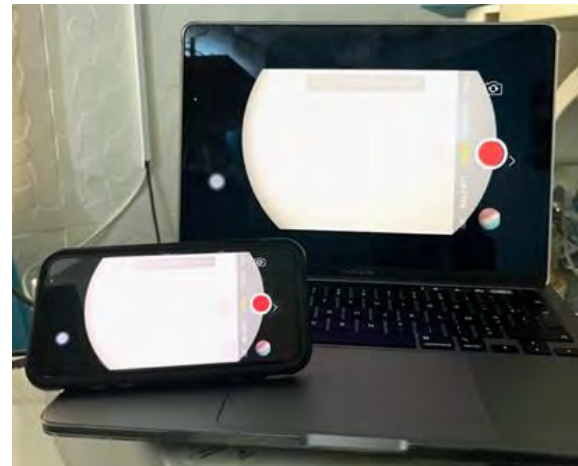
#### Perioperative application

The availability of smartphone has the potential to revolutionize MIS by making it more accessible and feasible in emerging countries. Laparoscopy by smartphone has been described by Chatzipapas in 2017 (60). The system consists of a rigid laparoscope with a 0° lens of 10 mm diameter connected with, a made-on purpose, applicator to a smartphone. The light source is a rechargeable diode. Our department uses an old endoscopic eyepiece. This system allows for the replacement of the visual part of the endoscopic trolley (endoscopic camera, camera and unit, the monitor and the light source). The system has been validated in several specialties such as urology, gynecology, ORL, digestive surgery. In gynecology it permits hysteroscopic and laparoscopic diagnostic and simple surgeries like salpingectomies, detorsion of adnexa, drainage

of abscesses, permanent tubal sterilization. This system is an autonomic one dispensing of the costly endoscopy turrets (Fig 3 a-3b).



**Figure 3 a:** Simple solutions using a smartphone and adapter to the scope and a diode light source. (Photo courtesy Emmanuel Nzau Ngoma)

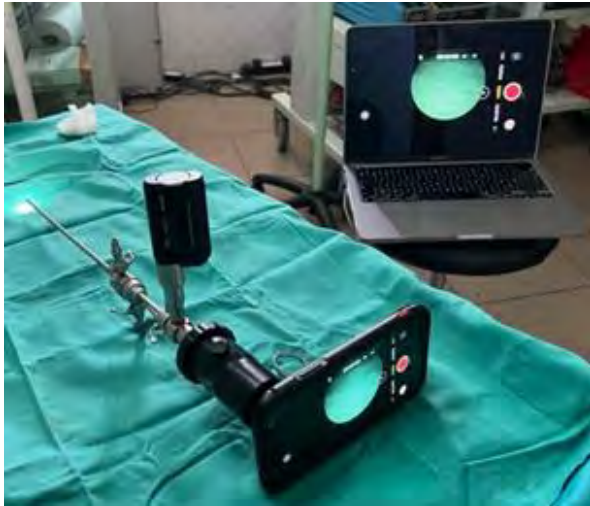


**Figure 3 b:** The screen of the smartphone is duplicated on the computer screen or any smart additional screen (Photo courtesy Emmanuel Nzau Ngoma)

The cost of these turrets is around 50 to 70 times more expensive. (61). The smartphone will allow



surgeons in the emerging countries to, in the future, have access to top technologies HD vision, 4K and even 3 D technologies. (62). The only limiting factor is the reduced live span of the mobile light source (Fig 4-5).



**Figure 4:** The smartphone and the lightsource fitted on the hysteroscope with the obtained image seen on the laptop. (Photo courtesy Emmanuel Nzau Ngoma)



**Figure 5:** Clinical application of the simple system in theatre. (Photo courtesy Emmanuel Nzau Ngoma)

### Postoperative application

These applications allow for observing the patients at distance after ambulatory surgery or even at home after being discharged. The registered information concerns: the temperature, the cardiac frequency, the oxygen saturation all of these are transmitted to the smartphone so that health care workers are rapidly informed in case of deterioration of the situation (63).

The smartphone can also be used as a tool to observe the importance of wound infection through image making and images captured and stored in the memory to compare in time or send to the medical and nursing staff. (64). This can be of pivotal importance in reducing the hospital stay but still maintaining adequate high-quality observation. Adapting these measures will in time allow significant reduction of the costs concerning surgical patients equally so in HICs as in LICs and LMICs countries (Fig 6).

	<i>Standard HD system cost (average of two companies)</i>	<i>Endoscope cost</i>	<i>Difference</i>
Video system	\$31,034	\$55	\$31,249
Camera	\$15,589	\$99 (contract) \$599 (no contract)	\$15,490 (contract) \$14,990 (no contract)
Total	\$46,623	\$154 (contract) \$654 (no contract)	\$46,469 (contract) \$45,969 (no contract)

**Figure 6:** Indicating the difference in costs between the classical systems and the smartphone system.

### Quality boost for initial and continuous education

The new numeric terminals can optimise the surgical training in the emerging countries and this using simulator made off materials that have been recycled and smartphones. The latter can

replace at the same time the camera and the screen. The high-definition images can be transferred to larger screens (65 - 66). It has been proven that simulation boxes manually made out of recycled materials are as efficient as commercially available simulators (67) (Fig 7).



**Figure: 7** An example of a smartphone training set. The one in the figure is still quite sophisticated and can be made even simpler with recuperated less costly materials.

It would also be interesting to make instruments and objects for the simulation by 3D printing. The use of the miniaturized cameras allows for perfect mimic the use and the manipulation of the endoscopic camera in theatre (68). The introduction of “touch surgery” as a tool in the education process of future surgeons allows for a good involvement in the surgical universe and represents an interesting pedagogic instrument in the LICs and LMICs. (69). The world-wide connectivity through the existing technologies can also facilitate the teaching and the learning by developing tools with video capacity like FaceTime, Skype, Google Duo, Zoom and many

others. These are able to allow for direct communication during consultation and guarantee a direct return of information. Tele learning and tele assistance would be appropriate in environments with limited resources. Labs for learning can be developed using databases and portable computers at low costs. (70 – 71 – 72 - 73).

### Conclusion:

Surgeons in LICs and LMICs have to adapt their equipment according to the local financial resources in respecting security.

Surgeons, decision makers and instrument makers have to work together more intensely with their focus on innovation to allow for access to surgery in the low-income countries and reduce the spending in the health services in the rich countries.

Key to success is the appropriate use of the local human and financial resources. In the future the surgeons will have to redefine the MIS as a surgery on measure of both the patient and the local circumstances and adapt MIS to reduced human and financial realities.

The learning institutions, medical faculties at universities and others in the LICs and LMICs will have to integrate courses focused on the economy of the health systems.

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## Intrauterine bone findings among women attending hysteroscopy at CHRACERH – Yaoundé: report of 6 cases

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### Abstract

**Introduction:** The presence of intrauterine bone structures during hysteroscopy is an unusual finding.

**Materials and methods:** We carried out a retrospective descriptive study at the Centre Hospitalier de Recherche et d'Application en Chirurgie Endoscopique et Reproduction Humaine (CHRACERH) between September first 2017 to August 31<sup>st</sup> 2022. The CHRACERH is a public facility addressing infertility and dedicated to minimally invasive surgery in Yaoundé – Cameroon. All procedures of hysteroscopy performed in theatre were reviewed. All cases of patients reporting the presence of intrauterine bones during the procedure were processed.

**Results:** Six cases of intrauterine bone structures have been identified out of 854 hysteroscopies. The prevalence over the five-year period was 0,7%. The mean age of patients was 35.2 years. All patients

revealed a past history of mid trimester abortion. For one patient, the history of abortion was confessed retrospectively after the diagnosis of retained bony fragments. A past history of Sexually Transmitted Infection (STI) was recorded for three patients (50%). The clinical symptoms included infertility in all patients (100%), lower abdominal pain in three (50%) and oligomenorrhoea in two (33.3%). Routine work-up identified the presence of intra uterine calcifications in five patients (83.3%). In one case, the finding of bone structure was unexpected. The hysteroscopic procedure permitted the complete retrieval of all bone fragments. There were no complications.

**Conclusion:** The prevalence of intra uterine bone findings during hysteroscopy at CHRACERH was 0.7%. All patients complained of infertility and recorded a past history of mid trimester abortion. Hysteroscopy permitted a successful and safe retrieval of all bone fragments.

**Keywords:** Bone, Intrauterine, Hysteroscopy, CHRACERH, Cameroon

## Introduction

The presence of foreign bodies such as bone structures within the uterine cavity is an uncommon hysteroscopic finding. The incidence of bone retention among women undergoing diagnostic hysteroscopy is 0.15% (1). Bone fragments account to 11.9% of foreign bodies removed from uterus by hysteroscopy in infertile patients (2). In the literature, there are two types of bone structures within the uterine cavity: the retention of foetal bones and the osseous metaplasia of endometrium.

Many theories can explain the presence of intra uterine bones structures. Foetal bone retention has been associated with uterine retention of foetal bones secondary to an incomplete second trimester abortion. Another theory is related to stromal mesenchymal cells graft from foetal origin, which can differentiate into osteoblasts

after termination of pregnancy, via cytokines and growth factors. The last theory is true osseous metaplasia of endometrial cells into osteoblast cells in response to chronic inflammation or trauma, similar to that occurring after calcification of fibrosis or abscesses (3-6).

Patients usually have no specific symptoms. Case reports have highlighted infertility, abnormal uterine bleeding, lower abdominal pain, dyspareunia, dysmenorrhoea, vaginal discharge and spontaneous passage of bone fragments in menstrual blood as major symptoms (2,6).

The main objective of this study was to determine the frequency and clinical presentation of intrauterine bone findings among women attending hysteroscopy at the CHRACERH.

## Materials and Methods

A retrospective descriptive study was carried out at the CHRACERH between September first 2017 to August 31<sup>st</sup> 2022.

The files of all women who underwent diagnostic or operative hysteroscopy were reviewed. The patients presenting intrauterine bony findings during the procedure were identified.

Data from medical files and reports were collected, including past medical history, presenting symptoms, pelvic ultrasound and radiological findings, surgical procedure data and postoperative follow up.

Written signed consent was obtained from all patients before the surgery. Confidentiality was guaranteed during the whole procedure. Approval from the ethic committee board was not sought because of the descriptive nature of the study and no patient was subjected to any other interventions.

## Results

During the period of the study, 854 hysteroscopies were performed. Among these six cases of intrauterine bony retention were identified a frequency of 0.7%.

The median age of patients was 35.2 years (range: 28 - 40 years).

All patients had a past history of mid trimester abortion with surgical approach dating from between three to 16 years. Two patients (33.3%)

had a history of three previous mid trimester abortion. However, in one case, the history of abortion was confessed after the surgical procedure and in view of the operative findings.

A past history of STI was recorded in three cases (50%). Mycoplasma infection in two cases (33.3%) and chlamydial infection in one case (16.6%).

On clinical presentation (Fig 1), all patients complained of infertility; average duration of 6.3 years (range 2-12 years). Chronic lower abdominal pain was identified in three cases (50%) and oligomenorrhoea in two cases (33.3%).



Fig 1: Clinical presentation

The presence of endometrial calcifications was recorded in four cases (66.7%) out of six pelvic ultrasounds, in two cases (66.7%) out of three hysterosonographies and in one case (50%) out of two hysterosalpingography, alongside with nonspecific findings such as fibroids and polyps (Fig 2). It should be noted that in one case, no intrauterine abnormality, other than calcified intramural fibroids, was found at routine

scanning.

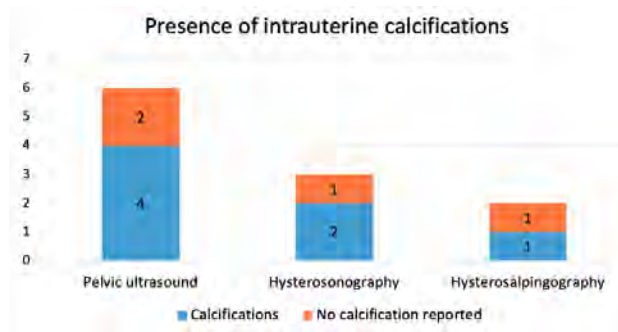


Fig 2: Routine scanning findings

Complete hysteroscopic retrieval of bony fragments was achieved in all cases. However, one patient needed two procedures to reach that goal. The average number of bone fragments was 8 (range 6-20). These were recognizable long and flat bones with nearly intact morphology. In one case however, a coral-like bone was described. During the procedure as well, stage 1 synechia was observed and treated in two cases (33.3%).

The postoperative follow-up was unremarkable. All patients resumed menses with normal volume during the next menstrual cycle and the ultrasound, performed in all patients, after one month was normal.

Pathological analysis of the endometrial specimen was carried out in three patients and reported a chronic endometritis with calcification. No DNA analysis was done.

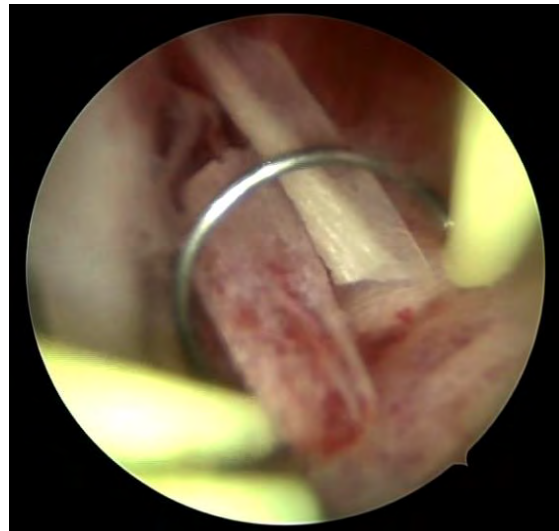
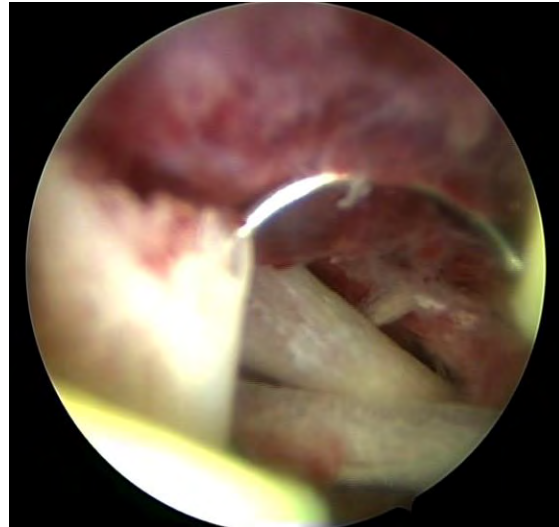


Fig 3: Hysteroscopic view of bones

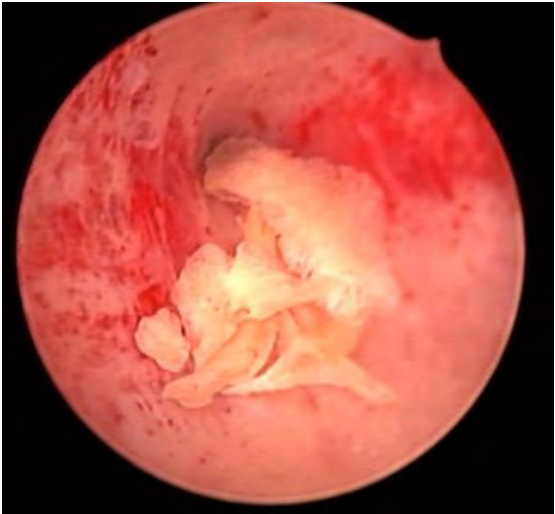


Fig 4: Hysteroscopic view of bones



Fig 6: Bones retrieved during a procedure

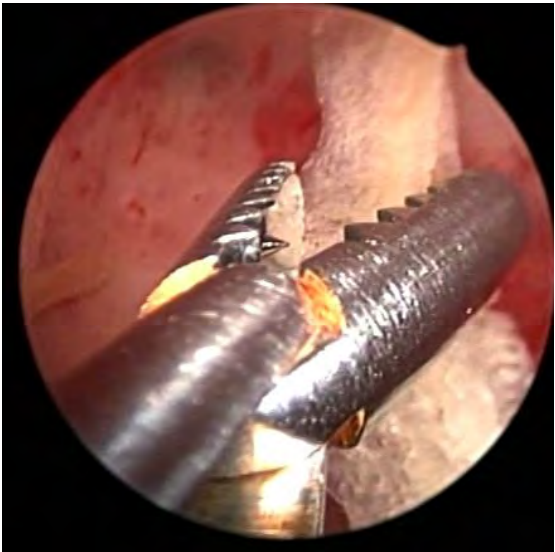


Fig 5: Bone retrieval with grasper

### Discussion

The incidence rates of retained intrauterine foetal bones found by Makris et al and Gainer et al were respectively 0.15% and 0.28% (1,7). A higher incidence of 0.7% was revealed in the actual CHRACERH study. Gainer et al reported a past history of first and second trimester abortion in five and 13 cases respectively out of 18 (7). In the literature, foetal bone retention has been diagnosed between eight weeks to 19 years after the termination of pregnancy (2,8). The CHRACERH study suggests that all patients had a past history of mid trimester abortion with surgical approach between three to 16 years and two patients (33.3%) had a history of three previous mid trimester abortions. One patient did not even mention the history of abortion until after hysteroscopy was performed. The reason being the legal settings, as in some

developing countries, abortion is prohibited. This leads to almost all abortions being performed illegally. There has been a number of undiagnosed women with this condition in these communities. Therefore, it is expected that a higher incidence of intrauterine retained bone fragments could be revealed by improving hysteroscopic practice. Physicians should keep in mind the remote possibility of a forgotten abortion while assessing infertility in our settings.

Xiao et al emphasized on the need of a systematic B-ultrasound examination, to ensure the emptiness of the uterus in case of termination of a pregnancy older than 12 weeks (9).

Gainger et al found that the main symptoms were menorrhagia (five cases), hypo/amenorrhoea (two cases), metrorrhagia (four cases) and chronic pelvic pain (two cases). He reported an incidental diagnosis of foetal bone in 12/18 patients (7). Van Den Bosch et al suggested that the presence of intramural bone does not impair fertility (10). Makris et al reported irregular vaginal bleeding as main complaint of patients in his study (1). Recurrent vaginitis and pelvic inflammatory disease may be rare presentations of foetal bone retention (2). The CHRACERH study outlined infertility, lower abdominal pain and oligomenorrhoea as part of the clinical symptoms in 100%, 50% and 33% respectively. The fact that the CHRACERH is

dedicated to infertility can explain that all the patients complained of infertility.

Retained foetal bones are supposed to act the same way as an intrauterine contraceptive device by increasing the production of menstrual prostaglandin E and prostacyclin. Increased level of prostaglandin E may also be associated with pelvic pain and dysmenorrhoea (2,8). It has been demonstrated that prostaglandin E<sub>2</sub> concentrations decreased by 50% after removal of bone (8).

The diagnosis is often unexpected on routine ultrasound. On ultrasonographic routine examination, the presence of intrauterine bright echogenic areas with posterior acoustic shadowing should alert the physician (5). However, differential diagnosis includes intrauterine devices, foreign bodies, Asherman's syndrome, calcified submucosal fibroids, mixed mesodermal tumours and adenosarcoma (2,8). The report of the ultrasound scan of one of the patients did mention the sole presence of calcified intramural fibroids. Supposedly the ultrasonographer did not pay attention to the presence of intrauterine calcifications allusive of bone retention due to the presence of numerous intramural calcified fibroids.

For definitive treatment, hysteroscopy is the gold standard. It may be helped by a preoperative gonadotropin-releasing hormone analogue therapy, which permits to see all the

abnormal tissue hence facilitate the removal (1,2). The use of ultrasound is advocated in case of numerous fragments to ensure safety and complete removal of the bone fragments (8,9).

The presence of bone marrow in the fragments is believed to be an argument against foetal origin since bone is not populated with hematopoietic cells until the third trimester of pregnancy. Although a heterotopic bone might be colonized by circulating hematopoietic stem cells leading to mature marrow. This could be definitely resolved by DNA analysis of the fragments (6).

In the literature, many case reports suggested the recovery of fertility after successful treatment of intrauterine bone retention (9,11).

## **Conclusion**

The prevalence of intrauterine bone fragments during hysteroscopy at CHRACERH was 0.7% over a five-years period. Infertility and a past history of mid trimester abortion were recorded in all cases. Routine scanning allowed the diagnosis of intrauterine calcifications in 83.3%. Hysteroscopy permitted a successful and safe retrieval of all bone fragments.

**Acknowledgements:** The authors wish to acknowledge the help of Bruno J van Herendael for his positive criticism and help by the translation.

## **Interest disclosure**

The authors declare that there is no conflict of interest regarding the publication of this paper.

## **Author's contribution**

Nyada Serge: design, data acquisition, analysis, manuscript write up and edition. All the authors have read and agreed to the final manuscript.

## **Résumé**

*Introduction :* La présence intra utérine de fragments osseux au cours d'une hystéroscopie constitue une trouvaille inhabituelle.

*Méthodologie :* Nous avons mené une étude descriptive rétrospective au Centre Hospitalier de Recherche et d'Application en Chirurgie Endoscopique et Reproduction Humaine (CHRACERH) entre le 1<sup>er</sup> septembre 2017 et le 31 août 2022. Nous avons revu tous les cas d'hystéroscopie et enrôlé toutes les patientes chez qui la présence de débris osseux intra cavitaires était rapportée.

*Résultats :* Nous avons retenu 6 cas parmi 854 procédures. D'où la fréquence de séquestres osseux durant la période d'étude de 5 ans était de 0,7%. L'âge moyen des patientes étaient de 35,2 ans. Toutes les patientes avaient un antécédent d'avortement tardif. Pour une patiente, l'antécédent d'avortement n'était avoué qu'après la chirurgie et au vu des trouvailles opératoires. Un antécédent d'infection sexuellement transmissible était

retrouvé chez 3 patientes (50%). La présentation clinique des patientes comportait une infertilité dans 100%, une pelvialgie dans 50% et une oligoménorrhée dans 33% des cas. Les examens de routine ont identifié la présence de calcifications intra-utérines dans 5 cas (83,3%). Chez une patiente, la découverte de séquestres osseux était fortuite. Nous avons au cours de l'hystérocopie procédé à l'ablation complète de tous les fragments osseux. Nous n'avons enregistré aucune complication.

*Conclusion :* La fréquence des fragments osseux de découverte hystérocopique au CHRACERH était de 0,7%. Toutes les patientes se plaignaient d'infertilité et avaient un antécédent d'avortement tardif. L'hystérocopie a permis l'ablation complète et sans complications de ces séquestres.

**Mots-clés :** Séquestres osseux, Intra-cavitaires, Hystérocopie, CHRACERH, Cameroun.



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## Chronic non-puerperal uterine inversion and submucosal fibroid: a case report

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### Abstract

**Introduction:** Inversion of the non- pregnant uterus is a rare condition. Its usual presentation is as an obstetric emergency during the removal of the placenta, and is easily diagnosed and managed. In contrast, a Non-Puerperal Uterine Inversion (NPUI) may be difficult to diagnose due to the delay in its presentation; once presented, there is a general lack of awareness in reaching a diagnosis, which may also pose a surgical challenge in management.

**Case report:** A 33-year-old woman, para 3 gravida 3, was referred from a local clinic to the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) with a history of a mass protruding through the vagina for one week. The patient was admitted to the Oncology Unit as a suspected Mixed Mullerian Tumour (MMT) or sarcoma and a biopsy of the mass was subsequently performed.

Histology revealed the presence of smooth muscle surrounded by inflamed granulation tissue, which lead to the diagnosis of a submucosal fibroid. The patient was referred to the Urogynaecology Unit for definitive surgical management.

**Management:** A combined abdominal-vaginal reposition of the uterus followed by a total abdominal hysterectomy (TAH) was performed. First, the submucosal fibroid was excised while the uterus was still inverted. A Pfannenstiel incision was performed, and the cervical ring and the posterior uterine wall was incised. The uterus was reduced into the normal position in the abdominal cavity. Routine TAH was performed as the patient had completed her family. Postoperative management was uneventful.

**Conclusion:** This case outlines the importance of early diagnosis and management of uterine inversion and intends to increase awareness amongst general practitioners, as early referral is paramount in the management of these patients.

**Key words:** Uterine prolapse, vaginal bleeding, fibroid uterus complications, submucosal fibroid, uterine inversion

### **Introduction:**

Uterine inversion is a rare condition, which most commonly presents as an obstetric emergency. Puerperal uterine inversion is a rare complication of delivery with an incidence of ranging from 1 in 3500 to 20,000 deliveries in the United States<sup>1</sup>. It is usually associated with excessive umbilical cord traction during the removal of the placenta and is more common in patients with an atonic uterus, or patients with a fundal implanted and morbidly adherent placenta<sup>2,3</sup>. The diagnosis is made with relative ease and is subsequently managed during the third stage of labour.

In contrast, Non-Puerperal Uterine Inversion (NPUI) is more difficult to diagnose. This is mainly due to the delay in presentation; once presented, there is a lack of awareness to reach the diagnosis. Failing to diagnose on time may have catastrophic consequences. NPUI is almost always associated with benign uterine tumors, with submucosal leiomyomas considered to be the most frequent cause. Malignant conditions are occasionally associated<sup>4</sup>.

The incidence of NPUI is not known, however, a systematic review done by Rosa Silva et al. noted a total of 170 case reports in 2018<sup>5</sup>, with the majority of cases being associated with uterine

fibroids. We describe the case of a 33-year-old woman who presented with a large mass protruding through the vagina and the surgical technique applied to reinvert the uterus.

### **Case Report:**

A 33-year-old woman, para 3 gravida 3, whom had completed her family, was referred by the local clinic to Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) with a one-week history of a large mass protruding through the vagina and associated lower abdominal pain. Additionally, she reported that the expulsion of this mass was accompanied with acute onset severe lower abdominal pain, but without bleeding, and subsequent foul-smelling vaginal discharge in the days that followed. Further review of her history revealed a previous diagnosis of uterine fibroids without follow-up for management. Records were unavailable for review.

On examination, she was found to be stable, with a blood pressure of 114/70mmHg, a pulse rate of 92 beats per minute, with a body temperature of 36,8°C and a respiratory rate of 18 breaths per minute. General examination of her systems was unremarkable. On specific local examination, a

mass of approximately 10x8cm was noted, with an irregular border and areas of bleeding and necrosis (Figure 1). On abdominal-pelvic and rectal examination, the uterus could not be palpated in the pelvis. Additionally, the cervix could neither be seen nor palpated.



**Figure 1:** Complete inversion of the uterus with submucosal fibroid protruding through the vagina

Following the findings noted on examination, a transabdominal ultrasound was performed. Transabdominal ultrasonography could not identify the uterus in the pelvis cavity and there were no adnexal masses or ascites noted. Blood results revealed a mild anemia with a hemoglobin of 9,8g/dL, a white cell count of  $7,97 \times 10^9/L$  and a normal renal function.

The patient was subsequently admitted to the Gynecology Oncology Unit as a suspected Mixed Mullerian Tumor (MMT) or sarcoma, and a biopsy was performed. Histopathological diagnosis revealed smooth muscle surrounded by inflamed granulation tissue, suggestive of a leiomyoma. There was no severe atypia or malignant features within the submitted tissue.

Following these findings, the patient was then referred to the Urogynecology Unit for further surgical management.

The patient was consented for surgery with a tentative diagnosis of NPUI due to submucosal fibroid. Considering the age of the patient, and the fact that the patient had revealed that her family was complete and thus fertility was no longer desired, a decision for a TAH with conservation of the ovaries was taken. A combined abdominal and vaginal approach was planned. Prior to commencing with the surgery in the operating theatre, examination under anesthesia was done and a tight cervical ring was identified behind the mass. First, the submucosal fibroid was excised to reduce the volume of the mass protruding through the vagina (Figure 2).

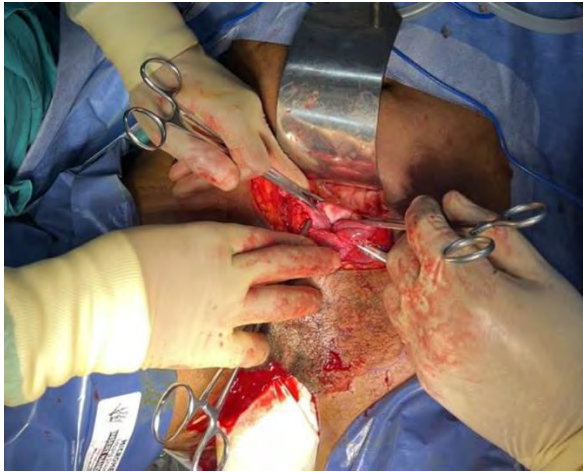


**Figure 2:** Electrocautery of the submucosal fibroid.

A Pfannenstiel incision was performed and routine abdominal entry revealed the classic “flower vase” appearance (Figure 3) of the



ovarian ligaments, fallopian tubes and round ligaments, as they were pulled down by the uterine fundus. Attempt to reposition the uterus abdominally by applying tension on both round ligaments (Huntington procedure) failed. At this stage both the round ligaments were clamped, cut and ligated bilaterally (Figure 4).



**Figure 3:** Posterior uterine ring and the “flower vase” appearance of the fallopian tubes and ovarian ligaments with no uterus in the pelvis



**Figure 4:** Clamping of the round ligaments bilaterally.

Next, the firm posterior surface of the cervical constriction ring and part of the posterior uterine wall was incised with electrocautery (Figure 5), whilst applying gentle upwards pressure vaginally (Haultain procedure). The uterus was subsequently reinverted to its normal anatomy by placing a finger abdominally through the myometrial incision and exerting pressure on the fundus (Figure 6).

Finally, a TAH was performed. Postoperative management was uneventful and the patient was discharged home on day 3. Follow-up was planned for six weeks post-operatively and the patient had no complaints.



**Figure 5:** Posterior cervical ring and posterior uterine wall being incised.



**Figure 6:** Uterus pushed back into its anatomical position.

### Discussion:

Chronic uterine inversion or NPUI is a condition in which the uterus turns inside-out with prolapse of the fundus through the cervix. It is a rare complication<sup>2</sup> and is usually precipitated by a large submucosal fundal fibroid. The condition will typically present in a multiparous woman with a history of leiomyomas with a painful mass protruding through the vagina. Risk factors for NPUI include thin uterine walls, multiparity, rapid growth of the fibroid, large size and fundal location<sup>3</sup>. The two treatment options available are hysterectomy or repositioning and repair of the uterus. The factors which need to be considered while planning the surgery are whether the mass is benign or malignant, how easily the uterus can be reduced, and the need for fertility preservation.

The pathophysiology is poorly understood but it is suggested that the distension of the myometrium due to the enlarged tumor irritates the muscle cells of the uterus, thus initiating contractions which can result in dilatation of the

cervix, resulting in the expulsion of the tumor and pulling the uterine fundus down with it<sup>2</sup>.

Uterine inversion is classified as incomplete, complete and total inversion and is described in stages 1 to 4<sup>6</sup>. In stage 1, the inverted uterus remains in the uterine cavity. Stage two describes the complete inversion of the fundus through the cervix. To be classified as stage three, the inverted fundus will protrude through vulva. Finally, in stage 4, there is total inversion of the uterus and the vaginal wall through the vulva. While stage 1 inversion will often offer easy repositioning of the fundus, inversions in stages 2-4 are likely to be more demanding. The case presented in this case report was one of stage 4 total uterine inversion. The diagnosis was based, as first described by Lascarides<sup>6</sup>, on the fact that the cervical ring was not recognizable along the proximal part of the mass. Additionally, there was no cervical opening identifiable along the distal part of the mass, and, during bimanual rectal and abdominal examination, the uterus was not palpable or within its normal position in the pelvic cavity. Sometimes similar clinical findings can be found in cases of enlarged submucous fibroid protruding through the cervix, which is why ultrasonography is an important investigation to be conducted prior to surgical intervention. In this case, the

transabdominal ultrasound revealed the absence of the uterus within pelvic cavity and confirmed the diagnosis of complete uterine inversion.

Four techniques have been described to manage this condition. The Spinelli<sup>7</sup>, Kustner<sup>8</sup>, Huntington and Haultain<sup>9</sup> procedures. The Spinelli and Kustner procedures are both done vaginally<sup>7,8</sup>. The cervico-isthmic constriction ring is incised, either on the anterior aspect of the cervix (Spinelli) or on the posterior aspect

(Kustner) before the uterus is reinverted<sup>7,8</sup>. Kustner enters the pouch of Douglas vaginally and splits the posterior aspect of the uterus and cervix to revert the uterus<sup>8</sup>. Spinelli describes incising the anterior aspect of the cervix and reverting the uterus thereafter<sup>7</sup>.

The Huntington and Haultain procedures<sup>9</sup> are done trans-abdominally, either open or laparoscopically. In the Huntington procedure, a clamp, such as an Allis or Babcock, is placed on each round ligament with gentle upward traction, moving the clamps until the inversion is corrected. This is less invasive and does not involve incising the uterus. This was attempted initially in our case, but was unfortunately unsuccessful. We then proceeded with the Haultain procedure<sup>9</sup> by entering the abdomen with a Pfannenstiel incision. Incision of the posterior aspect of the vaginal-cervical ring with the posterior wall of the uterus to facilitate the inverted uterus to be reinverted to its normal anatomy (Figures 5 and 6).

Although vaginal methods are well described in the literature, the abdominal route is preferred as it allows for better visualization of the anatomy and has fewer complications associated with it<sup>10</sup>. This is the technique that is routinely performed in our unit irrespective of whether the uterus is to be removed or uterine preservation is desired. Bladder and ureter injuries are known

complications of hysterectomies when performed vaginally, and the inverted uterus makes the surgery all the more technically difficult.

Operating without repositioning of the prolapsed uterus should be considered in patients with previous pelvic surgery as the proximity of the ureters to the ovarian and uterine vessels due to traction on the vascular pedicles may lead to ureter injury<sup>10</sup>. Reflecting the bladder down is more difficult while the uterus is inverted and may inadvertently lead to a bladder injury<sup>11</sup>.

This case highlights the importance of the surgeon being comfortable with the diagnosis and management of the NPUI. A combined vaginal and abdominal surgical approach can facilitate repositioning and/or hysterectomy when there is a large protruding vaginal mass.

### **Conclusion:**

Chronic non-puerperal uterine inversion is uncommon. Its presence should be suspected when a larger prolapsed fibroid is encountered. Biopsy of the mass is mandatory to excluded malignancy. This case report intends to increase awareness amongst general practitioners, as early referral is crucial in the management of these patients.

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## A new hysteroscopic aspect for adenomyosis: case report

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### Abstract

**Study Objective:** to demonstrate a new hysteroscopic pattern for adenomyosis supported by histopathologic examination.

**Design:** A didactic description of the hysteroscopic sign and the diagnostic steps through a case report.

**Setting:** A private clinic in Algiers, Algeria.

**Case description:** 57-year-old, gravida 6 para 6 patient, with a history of 2 cesarean sections, recurrent urinary infections and a recent asymptomatic COVID-19 incidentally discovered at systematic blood tests. The patient presented with post-menopausal uterine bleeding. Ultrasound revealed an anteverted adenomyotic uterus with two distinct scars, a Doppler-free irregularly thick endometrial stripe and a unique vascular pedicle in the cervical canal arousing suspicion of endocervical polyp.

**Intervention:** Hysteroscopy revealed four small endocervical polyps, two uterine scar niches and a small isthmic millimetric polyp in the posterior wall of the distal isthmocele. The uterine cavity is triangular, with an arcuate fundus. The endometrium is atrophic and inflammatory in places, with numerous mucosal defects suggesting adenomyosis, diffuse throughout the entire cavity. At the right posterior-lateral edge, bluish circular lesions are seen with fine yellowish gold-like dots distributed on the surface. The latter was sampled and sent in a separate container to the pathologist.

**Main result:** Histological exam confirmed simple endocervical and endometrial polyps, as well as adenomyosis for the unusual dotted pattern.

**Conclusion:** Adenomyosis can present in different patterns at hysteroscopy. To our best knowledge, this is the first case demonstrating an additional sign for adenomyosis presenting as bluish lesions with a fine yellowish gold-like punctuation.

**Key words:** Adenomyosis; Bluish punctuated lesion; fine yellowish gold like dots; hysteroscopy; histopathology.

### Introduction:

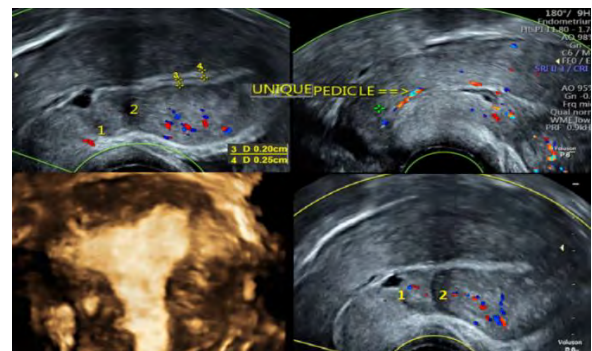
Although stronger levels of evidence remain necessary, many authors agree on the significance of some endometrial signs as indicators of adenomyosis at diagnostic hysteroscopy: cystic hemorrhagic lesions displaying a dark blue or a chocolate brown appearance, irregular endometrial surface with focal defects, increased vascularization and fibrous cystic appearance of intrauterine lesions (1,2).

In addition to allowing direct visualization of the endometrial lesions, hysteroscopy also provides the possibility of visually-guided sampling for a proper histopathologic examination. In this article, we report circular bluish lesions with a fine yellowish gold-like punctuation at the surface.

### Case report:

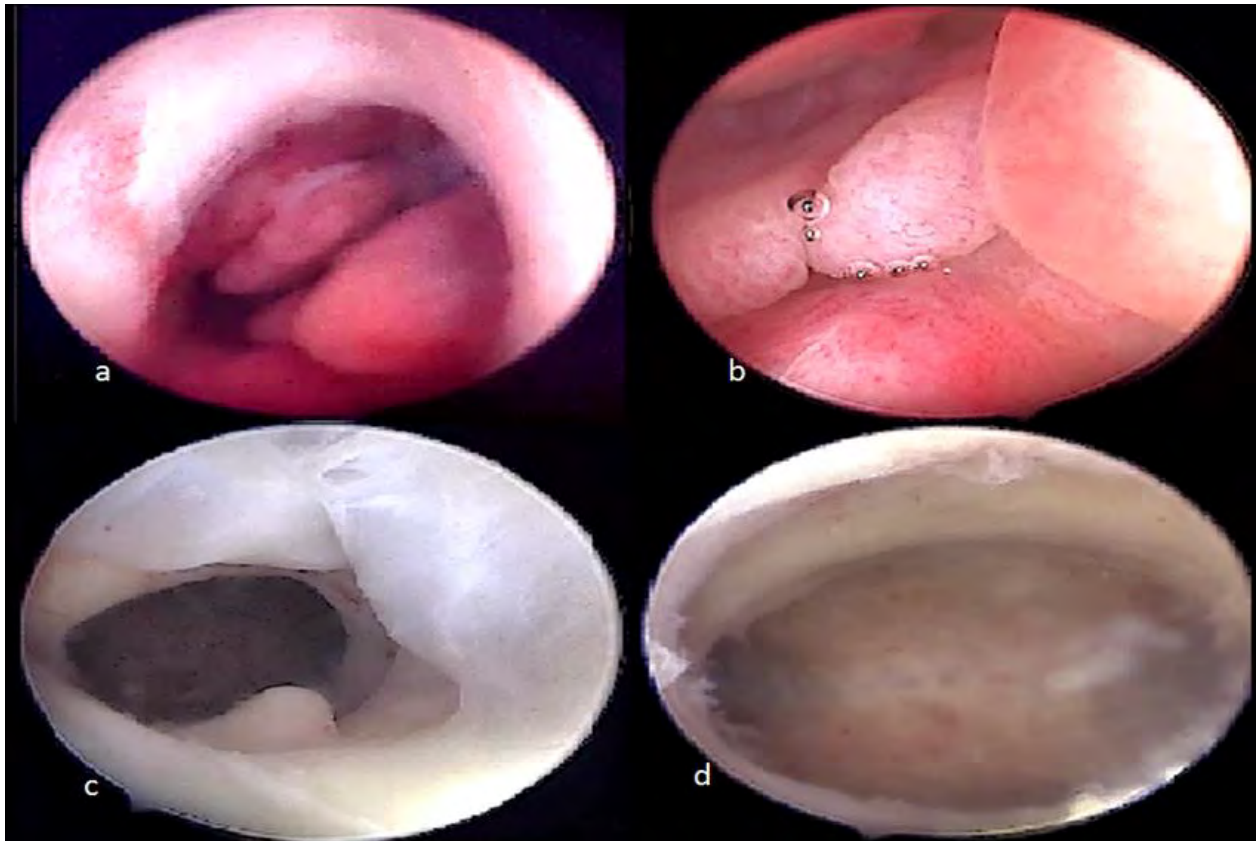
We report the case of a 57-year-old, gravida 6 para 6 patient, with a history of two caesarean sections, recurrent urinary infections and a recent asymptomatic COVID-19 incidentally discovered at systematic blood tests. The patient, menopausal at age 51, presented for post-menopausal uterine bleeding, with no additional symptoms or signs at physical examination. Transvaginal ultrasound revealed an anteverted anteflexed adenomyotic uterus – in accordance with the recent diagnostic criteria for adenomyosis (3) – with two visualized uterine scars. The endometrial stripe was irregularly thick but remained within normal limits and did

not exceed 4.5 mm of thickness. There was a thin layer of intra-cavitary fluid. At Doppler, a constant endocervical vascular pedicle was observed and aroused suspicion of an endocervical polyp (Fig 1).



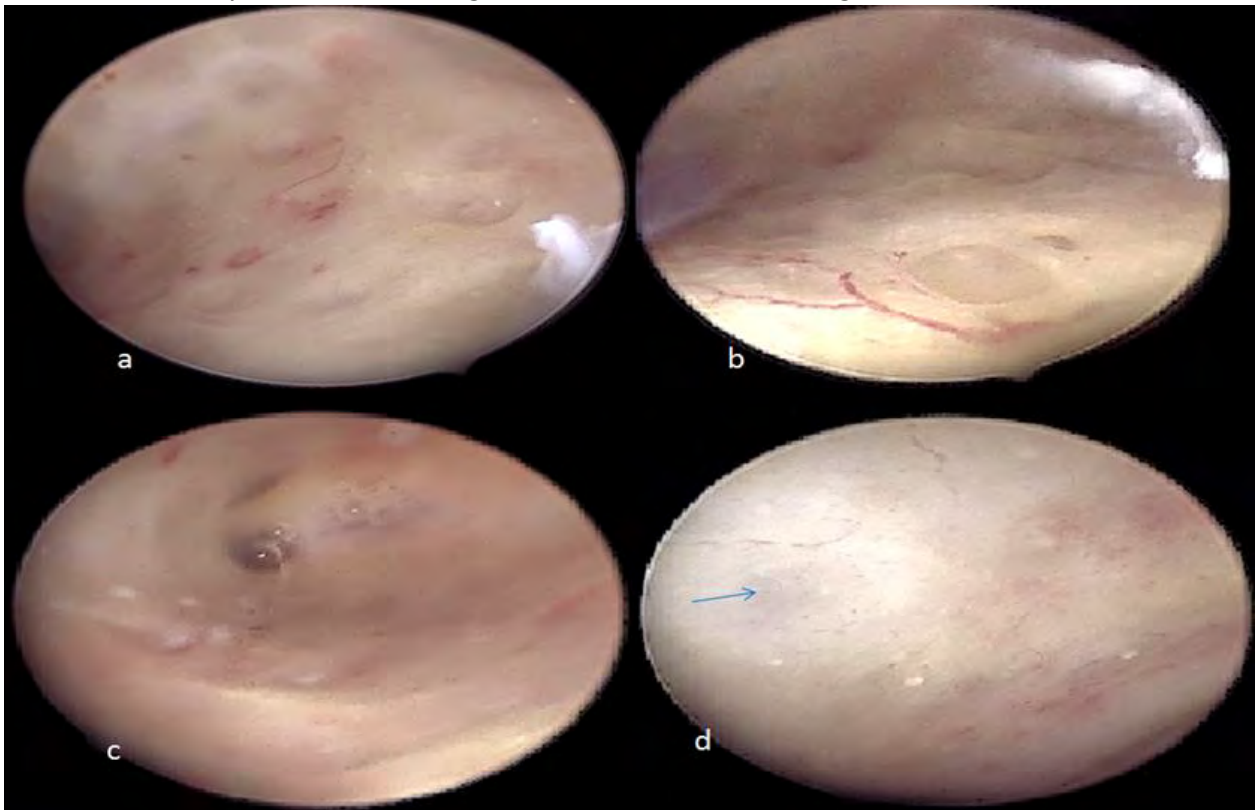
**Figure 1:** Transvaginal Ultrasound. 1: distal isthmocele; 2 proximal uterine scar; 3,4: measurements of the irregularly thick endometrial stripe; Yellow arrow: single endocervical vascular pedicle; 3D coronal plane of the uterus: adenomyosis.

Diagnostic hysteroscopy was performed through vaginoscopic route with a 5mm continuous flow office hysteroscope, 30° scope of 2.9mm diameter and revealed four small mucous-appearing endocervical polyps and two uterine scar niches: the distal was bigger with Nabothian cysts in its distal edge; the proximal one was smaller without inflammatory signs. A small millimetric simple-appearing endometrial polyp was observed in the posterior wall of the distal iche (Fig2).



**Figure 2:** Hysteroscopic findings. a,b: endocervical mucous polyps; c: distal isthmocele with nabothian cysts in its distal edge and a

small millimetric endometrial polyp of the posterior wall; d: the second (proximal) uterine scar with a slight niche.



**Figure 3:** Different adenomyotic patterns. a: endometrial defects; b: increased vascularity near an endometrial defect; c: fibrous cystic appearance of intrauterine lesions; d: fibrous cystic appearance of intrauterine lesions and blue submucosal hemorrhagic cysts (blue arrow).

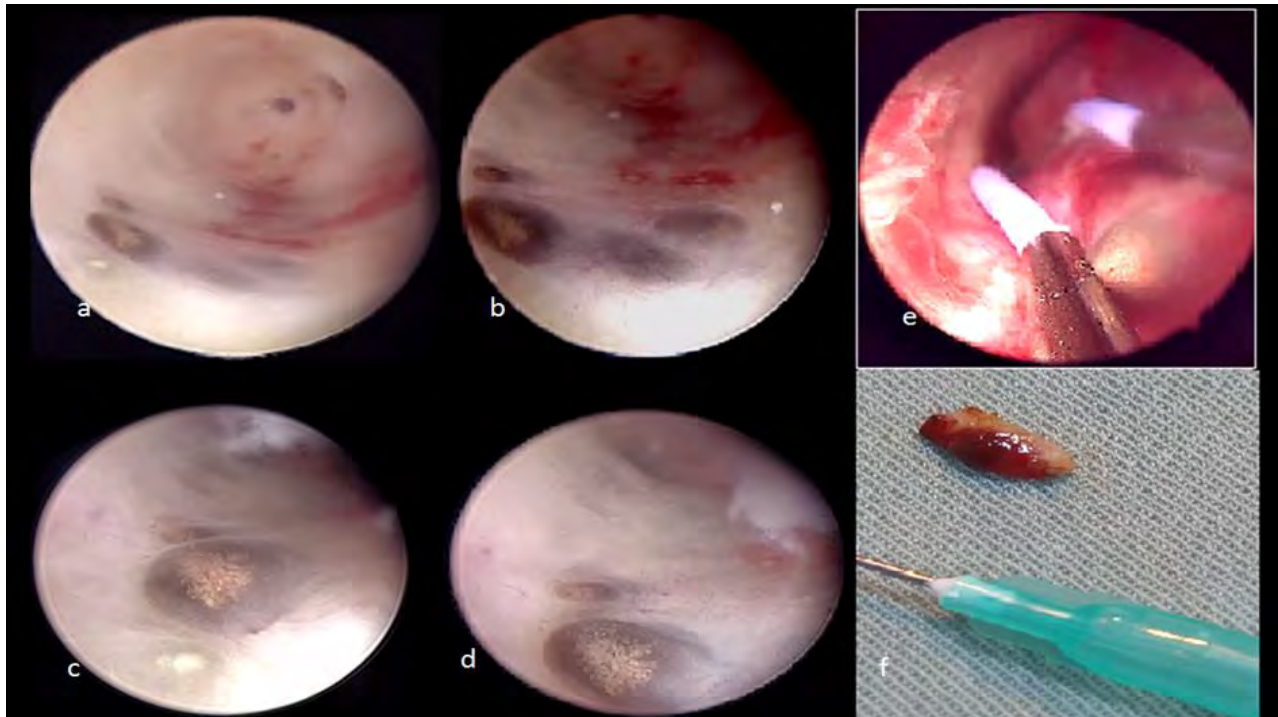
Moreover, the uterine cavity was triangular with a slightly arcuate porous fundus. The endometrial mucosa was atrophic and inflammatory in places, with numerous mucosal defects suggesting adenomyosis, diffuse throughout the entire cavity. Another observed sign of adenomyosis was the presence of increased vascularity and fibrous cystic appearance of intrauterine lesions (Fig3).

At the right posterior-lateral edge, near the tubal ostium, bluish circular lesions were seen with fine yellowish gold-like dots distributed on the

surface with a discrete hypervascularity surrounding them (Fig 4).

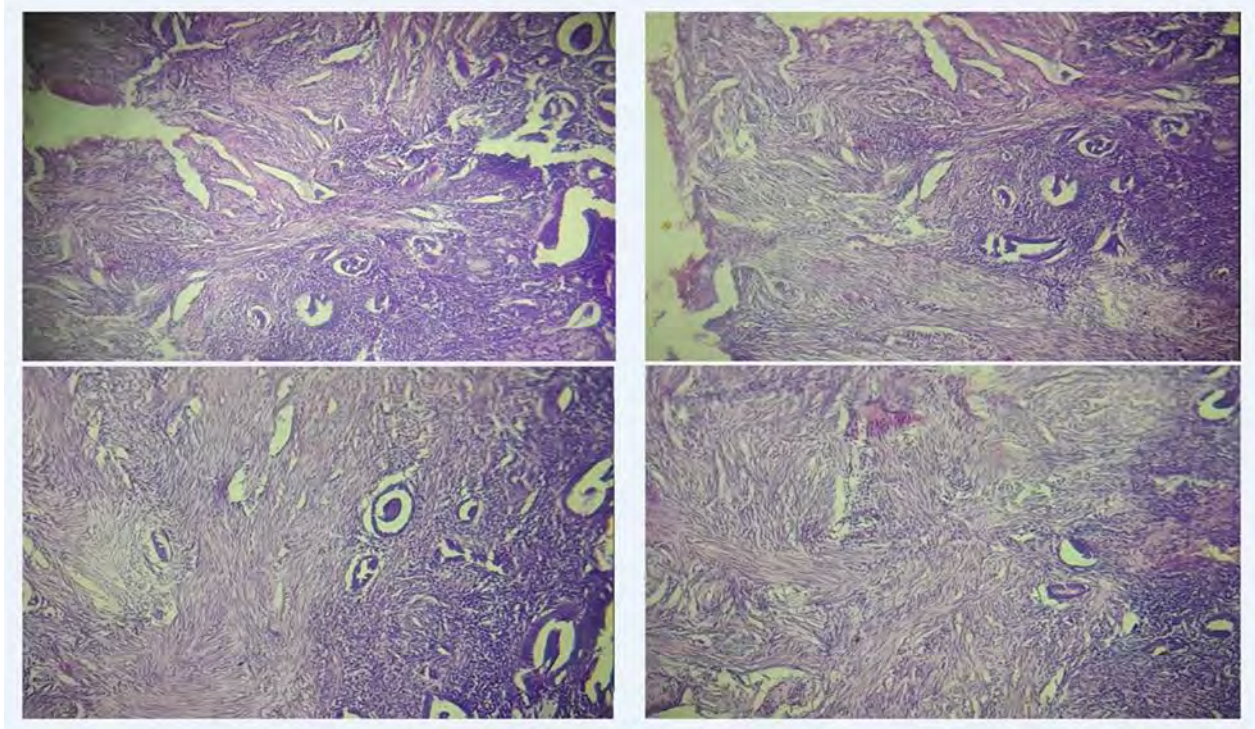
With the semi-circular loop of an 18.5 F bipolar 12° miniresectoscope and without cervical dilatation, all the polyps were removed. The unusual dotted bluish lesions were also resected until the endomyometrial layer and sent in a separate container to the pathologist.

Histopathologic examination confirmed the benign nature of all the removed endocervical and endometrial polyps, as well as adenomyosis for the unusual dotted pattern, defined by the presence of both endometrial glands and stroma in the underlying myometrium (Fig 5). There was no histopathologic explanation for the yellowish dots however, although the possibility of lipid deposits could not be ruled out.



**Figure 4:** The new hysteroscopic pattern for adenomyosis: bluish lesion with a fine yellowish punctuation. a-d: different views from different distances; e: Visually guided resection taking the lesion with the underlying myometrium; f: macroscopic view.





**Figure 5:** *histopathological examination: atrophic endometrium with the presence of endometrial glands and stroma within the underlying myometrium.*

### Discussion:

Adenomyosis is a benign condition where endometrial glands and/or stroma are present within the myometrium. Heavy menstrual bleeding, pelvic pain, subfertility, and a higher risk of miscarriage/obstetrical complications are the most common symptoms although two in three patients are asymptomatic (4). Moreover, it is one of the entities of the PALM-COEIN FIGO classification of abnormal uterine bleeding (Polyp; Adenomyosis; Leiomyoma; Malignancy and hyperplasia; Coagulopathy; Ovulatory dysfunction; Endometrial; Iatrogenic; and Not yet classified - International Federation of Gynecology and Obstetrics).

Adenomyosis, defined as the presence of functional endometrial glands/stroma within the myometrium, is distinct from endometriosis, as the latter is defined by the presence of functional

endometrial glands/stroma outside of the uterus. However, their association is often reported, also with other gynecological benign conditions, such as uterine fibroids (4,5).

In terms of pathogenesis, despite the condition being not yet fully elucidated, there is an increasing amount of studies highlighting the role of sex steroid hormone receptors, inflammatory molecules, extracellular matrix enzymes, growth factors, and neuroangiogenic factors in the genesis of adenomyosis (5)

Although it is classically considered as the condition of the over 40 years old multiparous woman, the epidemiological data increasingly report adenomyosis in young symptomatic and/or asymptomatic women by using imaging techniques such as transvaginal ultrasound and magnetic resonance imaging (MRI) (3,4). However, there is no agreement on the

definition and classification of adenomyotic lesions from both the histopathology and the imaging point of view. A classical histological definition for adenomyosis consists of the invasion of the myometrium by functional endometrial glands and/or stroma, deeper than 2.5 mm from the endometrial–myometrial junction, accompanied by adjacent smooth muscle hyperplasia (6). Meanwhile, other heterogeneous histopathological definitions coexist, ranging from the simple disruption of the endometrial–myometrial junction to a more than 8 mm invasion-depth of adenomyotic tissue.

Thanks to the progress of imaging techniques, adenomyosis is progressively moving from a histological diagnosis to an ultrasonographic entity that could also be diagnosed by ultrasound and MRI (3,6).

Hysteroscopic examination of the endometrial mucosa allows visualization of subtle changes which are suggestive of adenomyosis although the pathological value is still to be proven. Among the significant signs, but still not pathognomonic: hyper-vascularization, irregular endometrial surface with focal defects, submucosal hemorrhagic cysts displaying a dark blue or a chocolate brown appearance and fibrous cystic appearance of intrauterine lesions (1,2,6) (Fig 3). All these signs were documented in our patient. Another described sign for adenomyosis is the strawberry pattern (2,6): a reddish area punctuated with irregularly spaced white dots, which is already known as a sign for chronic endometritis (CE) (7). However, CE as currently defined, is a problematic entity which we have already addressed in previous works, as it does not acknowledge the physiological chronic inflammation of normal endometrium, neither does it acknowledge the role of factors other than germs in causing the disorder (8). This is the reason why a more convenient terminology

was proposed to name inflammatory disorders of the endometrium, which is Impaired Inflammatory State of the Endometrium (IISE) (8). The strawberry pattern is one of the signs for chronic IISE as it reflects a variable hypotrophy of the interglandular stroma, causing the underlying vascular network to be more visible (explaining the red color) and also explaining the irregular distance between glandular orifices (the white dots) (7,9). Moreover, in a recently published work, the impact of ectopic endometrium on the eutopic one was stressed and consistent data do reveal the role of endometriosis in causing increased intrauterine endometrial inflammation (10). Hyperemia and strawberry pattern were observed in our patient near the bluish cysts as well as the yellow-punctuated ones.

Histological examination of hysterectomy specimens has been the gold standard to make the final diagnosis of adenomyosis. Hysteroscopic exploration of the sub endometrial myometrium provides the opportunity to make the histopathologic diagnosis of the disease without hysterectomy (6). Consequently, the sampling is ideally performed using a resectoscope (or a miniresectoscope) allowing the resection of the endomyometrial layer beneath the lesion. In order to obtain an adequate biopsy with this approach, some authors advocate performing first a resection of a superficial specimen including both the endometrium and the underlying myometrium layer and then a second biopsy deeper into the dent left behind by the first resection, including only myometrial tissue (2). It is of utmost importance to respect all the precautions inherent to a good quality sampling for interpretation by pathologists (11). In our patient, the endometrial atrophy has allowed to sample a sufficient amount of underlying myometrium at one resection (Fig 4). Our

iconography illustrates a good correlation between ultrasound, hysteroscopy and histopathology. Meanwhile, the coexistence of scar niches, endometrial polyp and intracavitary fluid can be considered as interfering factors, potentially impacting the hysteroscopic appearance of adenomyosis. Consequently, further observations are needed.

### Conclusion:

In our practice of hysteroscopy, a number of patterns are suggestive of adenomyosis, despite

the need for stronger histopathological evidence. The lack of consensual diagnostic criteria, as well as the interobserver variation even between experts are part of the factors making it difficult to interpret the findings from the different available studies. To our best knowledge, this is the first case providing an additional sign for adenomyosis, presenting as bluish lesions with a fine yellowish gold-like punctuation, and proven by histopathology. Further studies are needed to determine the specificity and sensitivity of this hysteroscopic pattern.

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## A case of giant uterine fibroid with pregnancy

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### Abstract

**Case history:** The patient was admitted to the hospital with a complaint of: menstruation being retarded for 50 days and a painless pelvic mass palpated by the patients some nine days before admittance. Since some four months the patient occasionally experienced a bloated feeling. However, she did dismiss the feeling and did not seek for treatment.

**Uterine body:** difficult to palpate; **Pelvis:** palpable huge lump, upper edge of the lump is located three fingers under the xiphoid sternum, irregular in shape, no tenderness. The final diagnosis made is one of a huge uterine fibroid with pregnancy.

The postoperative pathology diagnoses the giant lump as a leiomyoma according to immunohistochemical results. Immunohistochemical report: CD10 (+), desmin (+) SMA (+), CD117 (-), NSE (-), S - 100 (-), Caldesmon (+), Ki - 67 (+ 2%), Vim (+) and CD34 + (blood vessels).

**Key words:** giant uterine fibroid; pregnancy; tocolytic agent; myomectomy;



## Introduction:

Fibroids are the most common benign tumors of the reproductive organs in women of childbearing age. Among these, the overall prevalence of uterine fibroids in pregnancy is about 0.3% (1). Huge gestational fibroids like the reported one are even rarer, most fibroids during pregnancy are asymptomatic and their size may change, but these changes vary from person to person. Most fibroids stop growing or shrink during the puerperium. The effect of fibroids on pregnancy depends on their number, size and location. Multiple fibroids or isthmic fibroids increase the probability of caesarean delivery (2). Therefore, it is necessary to carry out regular screening ultrasound scans before and during the pregnancy to diagnose and prevent possible fibroid related obstetric complications. The most common complication is red degeneration or myoma enlargement. The location can have a special effect the progression of labor. The patient reported had a delayed menstruation, she did feel abdominal discomfort and a huge mass was found, indicating that fibroids grow rapidly. In this case this is related to the patient's lacking routine examination before and during the pregnancy.

**Case history:** The patient was admitted to the hospital with a complaint of: menstruation being retarded for 50 days and a painless pelvic mass palpated by the patients some nine days before admittance. Since some four months the patient occasionally experienced a bloated feeling. However, she did dismiss the feeling and did not seek for treatment.

**Technical examination:** A pregnancy test was positive. Doppler enhanced ultrasound examination after admission did reveal: an echo poor structure in the uterine cavity 13x18x9 mm, no obvious fetal shadow or yolk sac. A huge echo dense area is revealed in the abdominal cavity,

measuring 275x155x273 mm, the outline is still clearly visible, the internal echoes are heterogeneous, blood flow signals are visible in the periphery, and there is no obvious boundary with the anterior wall of the uterus.



Fig 1: Ultrasound overview of the heterogenic abdominal mass



Fig 2 a



Fig 2 b

Fig 2 a-b: Ultrasound images of the pelvic mass, at the bottom of the picture the uterus is seen squeezed to posterior. The cavity is hypoechogenic 13x18x9 mm (1<sup>+</sup>-2<sup>+</sup>). No signs of an evolving pregnancy

**Gynecological examination:** Uterine body: difficult to palpate; Pelvis: palpable huge lump, upper edge of the lump is located three fingers under the xiphoid sternum, irregular in shape, no tenderness. The initial diagnosis made is one of a huge pelvic fibroid equaling the size of a first trimester pregnancy. In view of the extension of the abdominal mass open abdomen surgery is decided upon to confirm the preoperative examination and diagnosis. At the start of the abdominal exploration no ascites is seen. The abdomen is flushed with 50ML of peritoneal irrigation solution and sent for pathology, no tumor cells were seen. The lower border of the tumor is close to the bladder, the upper border reaches up to the umbilicus, the left border is close to the pelvic wall, by palpation the uterus feels like a 7 weeks gestation. The uterus is squeezed by the tumor into the right pelvic lateral fossa, both ovaries are normal, the capsula of the mass is opened and gradually separated, it is noted that the lump originates at the level of the anterior isthmus of the uterus extending towards the cervical canal and the left broad ligament, the blood supply is abundant, the lump is removed and weighs 4500g with a diameter 28 cm. The intraoperative bleeding is 300ml, and the surgery progresses smoothly.



Fig 3 Peroperative image of the enlarged uterus and the huge pelvic mass. On the right the uterus and adnexa.

The postoperative pathology diagnoses the giant lump as a leiomyoma according to immunohistochemical results. Immunohistochemical report: CD10 (+), desmin (+) SMA (+), CD117 (-), NSE (-), S - 100 (-), Caldesmon (+), Ki - 67 (+ 2%), Vim (+) and CD34 + (blood vessels).

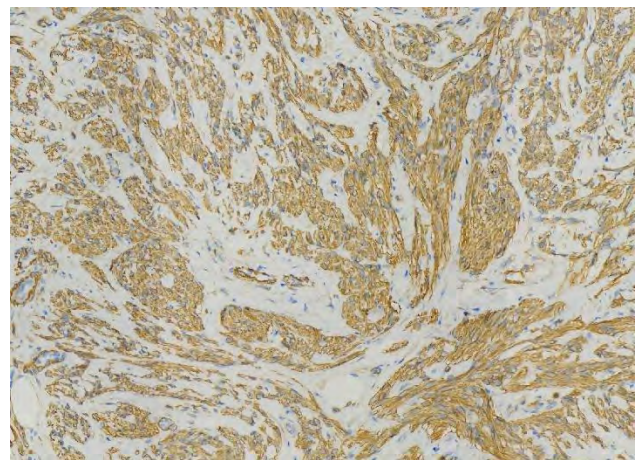


Fig 4 a

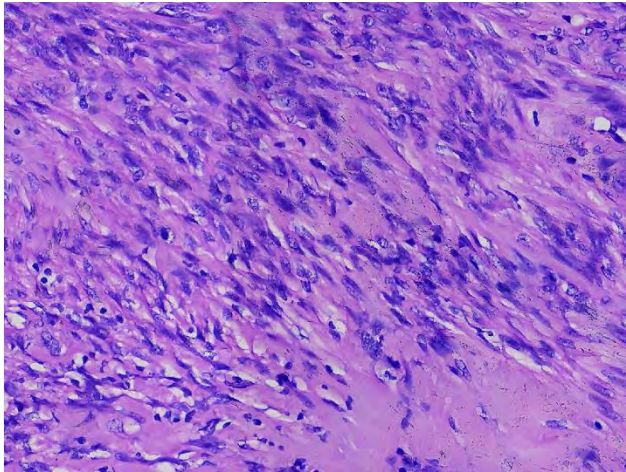


Fig 4b

Fig 4 a and b: the different pathology staining with final diagnosis leiomyoma

**Discussion:** Uterine fibroids have been reported to grow significantly in early pregnancy and then shrink or stop growing in the third trimester (3). Most women with uterine fibroids have an uncomplicated pregnancy (4). If fibroids do not give rise to symptoms and do not affect embryonic development, they can be followed up. For patients with fibroids affecting embryonic development or fibroid degeneration, symptomatic treatment such as antipyretic analgesia can be given, if conservative treatment is ineffective, myomectomy has to be performed. The best timing is the second trimester, because at that time the risk of miscarriage is relatively low. The risk of miscarriage after myomectomy has been reported in the literature to be between 18% to 35% (5). In the case reported, the uterus is squeezed by the large tumor, resulting in insufficient space for embryo development, resulting in no fetal heartbeat on ultrasound. Although didrogestosterone is given before and after surgery to protect the fetus, the outcome is not that good. The patient reported had a feeling of abdominal distension and after diagnostic tests revealed not to be suitable for a

continuing expectant management. The patient and family were informed of the risks of surgery before surgery, and the patient did give her consent for an abdominal myomectomy. According to the literature, there is no significant difference in the effect of laparoscopic and transabdominal myomectomy on pregnancy and fertility. Therefore, in the second trimester, minimally invasive surgery is the recommended method because of its advantages in the patient's postoperative recovery (6). In order to reduce the impact on the fetus, it is recommended to administer medication before and after surgery to prevent pregnancy loss (didrogestosterone, progesterone injection, magnesium sulfate, ), and adapt the duration of the medication according to the clinical symptoms, blood HCG and progesterone measurements and ultrasound findings.

For patients with uterine fibroids in the third trimester of pregnancy, there is no unified conclusion on whether to remove fibroids during cesarean section, some researchers believe that the removal of uterine fibroids at the same time by cesarean section can easily lead to an increased probability of postpartum hemorrhage. Therefore, myomectomy should be carried out with caution, subject to strict selection of surgery indications, and performed by experienced physicians, the incidence of uterine rupture in subsequent delivery is < 1% (7), and vaginal delivery is encouraged unless fibroids block the exit of the birth canal or cause persistent abnormal fetal positioning.

**Conclusion:** Especially in the first trimester of pregnancy there are not many literature reports nor on experience nor on treatment methods. Therefore, prevention becomes even more important. For women who are planning to become pregnant. The impact of the size, the

location, and the nature of the fibroids on a future pregnancy should be carefully evaluated after examination of the fibroids. In our institution classification is done according to the following three categories:

**1> Subserosal uterine fibroids:** subserosal fibroids are related to a decrease in implantation rate, clinical pregnancy rate and an increase in miscarriage rate. It can be expected that fibroids of less than 3cm, with no compression, degeneration nor torsion, allow, generally, a normal pregnancy.

**2> Myometrial fibroids** exceeding a certain size >5 cm, even without deformation of the uterine cavity, may negatively affect fertility (8). Regardless of whether these interfere with menstruation. It is recommended to try pregnancy after surgical resection. Pregnancy is recommended one year after surgery to reduce the occurrence of uterine rupture.

**3> Submucosal fibroids** can negatively affect fertility and can cause abnormal uterine bleeding, uterine infection, anemia and eventually other symptoms. For submucous fibroids or endometrial polyps  $\geq 1\text{cm}$ , hysteroscopic resection is recommended before pregnancy (9), The surgeon has to pay attention to protect the normal endometrium during surgery. Pregnancy can be tried 1 month after endometrial polyp removal and 3 months after

submucous fibroid surgery, if ultrasound examination and menstruation are normal.

The biggest difficulty in the case reported is that the duration of the gestation is still short, the fibroids are huge and symptomatic. Here the question is: how to remove fibroids in the most beneficial way for the patient. The patient already has abdominal distension and discomfort, and continued observation will cause worsening of symptoms, so surgery is indicated. Due to the special position of the uterus. The policy adopted consisted in first the removal of the fibroids followed by medical abortion. Safe removal of fibroids trying to preserve embryos is related to many aspects, not only related to the size, location and nature of fibroids, but also closely related to the development of the embryo itself.

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## A rare case of a vesicouterine fistula managed by 3 minimally invasive approaches (Video Article)

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### Abstract

Vesico-uterine fistulas account for 1-4% of all genitourinary fistulas and mainly occur as a result of cesarean section, with more than 90% of cases. The present study is a video article with the objective to describe

the surgical technique for the vesico-uterine fistula repair utilizing 3 simple minimally invasive intraoperative approaches: cystoscopy, hysteroscopy and laparoscopy. We show that the laparoscopic repair of vesico-uterine fistula can be an effective and safe approach.

**Key words:** vesico-uterine fistula, genitourinary fistula, laparoscopic surgery, laparoscopy, Youssef syndrome

**Objective:** To describe a safe reproducible laparoscopic technique for the repair of vesico-uterine fistulas.

**Design:** Video presentation

**Setting:** Private hospital in Curitiba, Brazil

**Interventions:**

A 44-year-old woman G1P1 with a history of cesarean section 8 years ago presented with complaints of menorrhea [1]. Transvaginal ultrasound revealed normal uterus and adnexa. Transabdominal ultrasound revealed a hyperechogenic polyp measuring 1.32 cm along the posterior wall of the bladder with normal kidneys (Figure 1). Pelvic magnetic resonance imaging identified a fistulous tract between the posterior wall of the bladder and the uterine isthmus measuring 0.9 x 0.4 cm partially occupied by a polypoid structure (Figure 2).

The steps of a laparoscopic repair of a vesico-uterine fistula are described in the video utilizing 3 minimally invasive surgical approaches: cystoscopy, hysteroscopy and an uncomplicated laparoscopic vesico-uterine repair.

In the first step, cystoscopy is performed revealing a vesical polyp, acting as an intrinsic valve to the intravesical fistula orifice located on

the posterior wall of the bladder at the level of the uterine isthmus.

The second step involves a diagnostic hysteroscopy to assess the endometrial cavity and location of the fistula orifice.

The third step involves the laparoscopic repair. Pneumoperitoneum is created via a Veress entry and insertion of 4 ports using the French configuration: a 10 mm intra-umbilical camera port and three 5 mm ports in the lower abdomen. At the level of the fistula, an incision was made on the vesical peritoneum with the use of an ultrasonic instrument. Next, the vesico-uterine space is dissected in order to mobilize the bladder from the lower uterine segment until identification of the vesico-uterine fistula is confirmed. Traditional principles of fistula repair as described by Couvelaire in the 1950s are meticulously followed [2]. We start with resection of the fistulous tract and its surrounding tissue using a laparoscopic extravesical technique as described by von Theobald and Miklos in 1998 and 1999, respectively [3,4]. The bladder closure is accomplished with continuous suture in vertical fashion using 3-0 Polydioxanone in two layers. The first layer incorporates the vesical mucosal and muscularis layers, and the second layer imbricates over the first layer. A two layer closure was also performed on the uterine

segment, after excising fistulous tract, a running suture of 2-0 Monocryl was used followed by two imbricating figure of eight sutures. A bladder integrity test with saline solution confirmed a watertight closure.

Operative time: 79 minutes, EBL 25 ml

The patient's postoperative course was uncomplicated. The patient was discharged from the hospital on postoperative day one with the foley catheter. The bladder was drained for 7 days. Pathological examination of the surgical specimen revealed tissue consistent with a fistulous tract, as well as, vesical mucosa with areas of endometriosis. At her 6 week follow up, the patient reported resolution of her symptoms.

#### **Discussion:**

Vesico-uterine fistulas account for 1-4% of all genitourinary fistulas, and are defined as a connection between the lumen of the urinary bladder and the uterine cavity or the cervical canal [5]. Vesico-uterine fistulas occur mainly as a result of cesarean section with more than 90%

of cases being attributed to benign gynecologic surgery [6]. The success rate of conservative management may be as low as 5% leaving surgery as the best management option in most patients [5,9]. Hysterectomy is not mandatory and does not seem to affect recurrence with successful term pregnancies reported following vesico-uterine repair [3]. As of August 11, 2022 there have been 28 conventional laparoscopic procedures reported in PubMed for vesico-uterine fistula, with 11 laparo-endoscopic single site (LESS) surgery, and 14 robotic cases with 100 % success rate. In our case, we described the laparoscopic repair of the vesico-uterine fistula and we showed the fistula aspect by cystoscopy and hysteroscopy as well.

#### **Conclusion:**

Minimally invasive techniques offer advantages as the optimal exposure of the operative field and less risk of complications, allowing an effective and safe approach for the management of vesico-uterine fistulas but are dependent on surgeon experience.





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## Pelvic Anatomy: Unusual Anatomical Ureteric Variation

### Do we need to be aware of? Video Case report

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### Abstract

In this video article, we are presenting the pelvis side wall anatomy, the spaces, the vascular system, and the nerves, also the ureteric pathway and unusual ureteric anatomical variation. The main objective of this video article is to present the pelvic side wall anatomy with evidence of an unusual ureteric anatomical variation. This is a surgical educational video in which the pelvic sidewall dissection is performed, and the pelvic anatomy is narrated step-by-step.

Every pelvic surgeon needs to have complete anatomical knowledge of normal pelvic anatomy. In this way, you can find any anatomical variation. The bottom line is to perform better surgical procedures. There are

some anatomical variations described in the global literature that we must consider during every surgical procedure

**Key words:** Anatomy, pelvic anatomy, anatomical variations, laparoscopy, minimally invasive surgery

**Objective:** To present the pelvic side wall anatomy with evidence of an unusual ureteric anatomical variation.

**Design:** Surgical educational video. Pelvic sidewall dissection is performed, and the pelvic anatomy is narrated step-by-step.

**Setting:** Every pelvic surgeon needs to have complete anatomical knowledge of normal pelvic anatomy. In this way, you can find any anatomical variation. The bottom line is to perform better surgical procedures. There are some anatomical variations described in the global literature that we must consider during every surgical procedure.

#### **Introduction:**

We never know what we can find in the retroperitoneal space until it is opened.

[ "Life is like a box of chocolates; you never know what you're going to get." –Forrest Gump.].

#### **Interventions:**

In this video article, we show a lateral pelvic wall dissection to get into the retroperitoneal space through the "Bermuda's Triangle", which is an inverted triangle right on the pelvic side wall, formed by the Utero-Ovaric-IP ligament and the ureter [1].

Its name is based on "Bermuda's Triangle," which is a geographical region of the Atlantic Ocean. Many people believe that some airplanes and ships have gone missing as they were crossing the triangle, but the evidence of this is

poor. The same feeling can apply to surgeons; some of them are afraid to get into the retroperitoneal space, but once you get used to it, it is straightforward and safe.

Once the retroperitoneal area is opened, the critical anatomical structures are identified and narrated. There are very well-visualized structures, like the infundibulo-pelvic (IP) ligament, external iliac artery and vein, internal iliac artery or well known as hypogastric artery and vein giving the bifurcation into a superior vesical artery or obliterated artery, and the uterine artery.

Knowing the anatomy, medially to the ureter we will find the Okabayashi space, lateral to the ureter the Latzco space, and the 4o space or Yabuki space is the space formed from the posterior peritoneal sheet that is just below the ureter getting into the bladder.

The complex nerves are formed by the obturator nerve which is not considered a "pelvic nerve" but is rather the primary nerve to the medial thigh, injury to the obturator nerve may cause painful spasms of the abductor muscles of the thigh and sensory deficits in the medial thigh region. The autonomic innervation of the pelvis is formed by sacral sympathetic trunks, hypogastric plexuses, splanchnic nerves, and peri-arterial plexuses. The hypogastric plexuses receive sympathetic fibers via lumbar splanchnic nerves and parasympathetic fibers via the splanchnic nerves, which innervate all the pelvic organs. The sympathetic fibers produce vasomotion, inhibit peristaltic contraction of the

rectum, and stimulate contraction of the genital organs during orgasm; The parasympathetic fibers stimulate contraction of the rectum and bladder for defecation and urination, respectively.

Knowing the pelvic nerve anatomy will allow us to preserve the integrity of the nerves during radical pelvic gynecological surgery.

Typically, the ureters enter the pelvis over the common iliac artery and medial to its bifurcation at the pelvic brim, so the ureter pathway goes into the retroperitoneal space beside the hypogastric roadway and below the uterine artery, the so-called "water under the bridge." In this case, the ureter is over the uterine artery and reveals a scarce anatomical variation for which there are no accurate statistics in the literature.

The only vessel that goes below the ureter is the uterine vein (2). Anatomical variations of the ureter and its relationship to surrounding

structures are therefore significant from an academic, as well as clinical and surgical perspective. Recently an article was published on this topic, and the researchers found a ureteric anatomical variation in cadaveric dissection. They conducted a literature search, which revealed no sources, suggesting that their case was the first one to make known this rare anatomical variation [3]. As such, we can assume that this is the first case reported in vivo model and evidenced by video surgery. Malformations of the urinary system are uncommon and comprise about 3% [4], which includes the horseshoe kidney, duplex ureter, megaureter, ectopic ureter, and ureterocele [5][6].

Conclusion: Every pelvic surgeon needs to have complete knowledge of the pelvic anatomy, which will allow her or him to detect any anatomical variation and, thus, perform better and safer surgical procedures to improve our women's health.

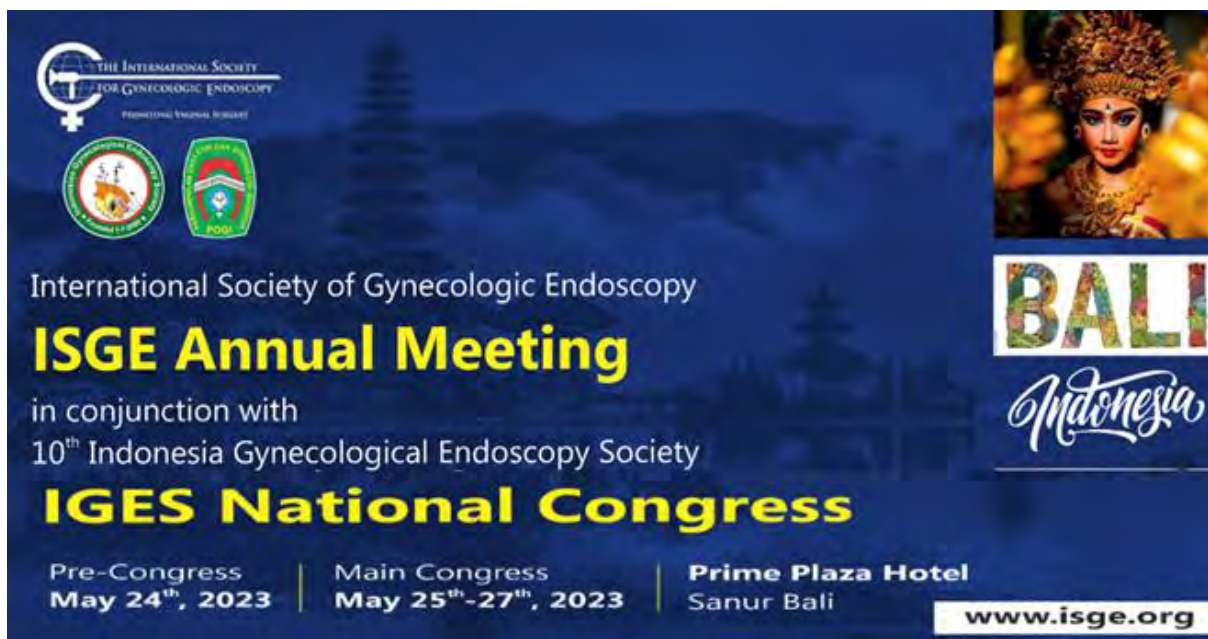
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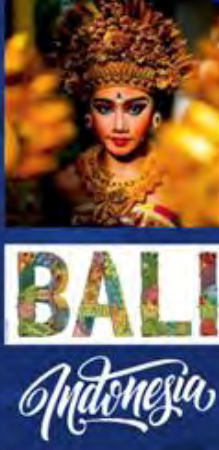
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