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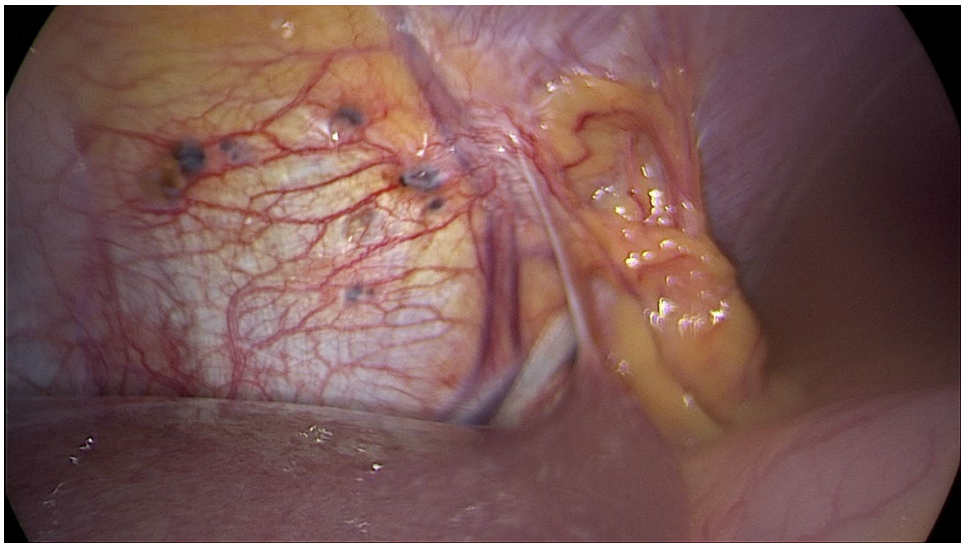

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Zanzibar 2025

The International Society for Gynecologic Endoscopy (ISGE) is delighted to announce its upcoming annual congress, scheduled to take place in the picturesque locale of Zanzibar from May 21-24, 2025. This year's congress holds particular significance as it marks a historic milestone: for the first time, a woman will assume the presidency of ISGE.

Dr. Anneli Linnamägi, hailing from Seinäjoki, Finland, is set to become the new president. With an illustrious career as an obstetrician-gynecologist and a specialist in minimally invasive gynecological surgery, Dr. Linnamägi has been an integral part of ISGE's leadership. Her previous roles include serving as a board member, secretary, and most recently, vice president. Her dedication to advancing gynecologic endoscopy is evident through her active involvement in the society's learning platform and her commitment to training and lecturing.

As we welcome Dr. Linnamägi to her new role, we extend our heartfelt gratitude to Dr. Eddy Hartono of South Sulawesi, Indonesia, for his unwavering commitment during his two-year tenure as president. An esteemed obstetrician-gynecologist and gynecological surgeon, Dr. Hartono has been instrumental in enhancing ISGE's presence, particularly across Asia. His leadership has fostered greater collaboration and knowledge exchange within the region, strengthening the society's global network. We are fortunate that Dr. Hartono will continue to lend his expertise to the Executive Committee as immediate past president, ensuring continuity and ongoing support for ISGE's mission.

We eagerly anticipate celebrating these leadership transitions and the continued advancement of gynecologic endoscopy at our forthcoming congress in Zanzibar.

The integration of robotics into surgical education is a growing trend in gynecologic endoscopy, and ISGE’s initiative to incorporate robotics into its program in Zanzibar reflects this global movement. Robotics has become a focal point at medical congresses, given its potential to enhance surgical precision and patient outcomes. However, existing literature presents a mixed perspective on its adoption, particularly in emerging and developing countries. While studies highlight the benefits of robotic-assisted surgery—such as reduced blood loss, shorter hospital stays, and improved ergonomics for surgeons—accessibility remains a critical concern. The high cost of robotic systems, limited training opportunities, and the need for extensive infrastructure present challenges in regions where conventional laparoscopic and vaginal surgery are still being optimized. For ISGE, this creates a balancing act: while the society aims to promote cutting-edge surgical advancements, it must also ensure that foundational techniques in gynecologic surgery remain a priority. The heterogeneous availability of robotic systems across different healthcare settings means that educational efforts must be tailored, providing knowledge on robotics while reinforcing skills in traditional and laparoscopic approaches. By addressing these disparities through adaptable training models, ISGE can bridge the technological gap while maintaining its commitment to accessible and effective gynecologic surgery.

Guenter Noé

Editor in chief

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The frontpage shows:

1. Diaphragmatic endometriosis under the heart;
2. Endometriosis awareness ribbon / Endo-march

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The Role of Robotic Surgery in Gynecology: Advancing Precision and Outcomes in Complex Procedures

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Abstract

Abstract

Laparoscopy revolutionized gynecological surgery by enhancing precision, reducing recovery time, and minimizing hospital stays. However, as surgical demands grew, traditional two-dimensional laparoscopy revealed limitations, particularly in-depth perception and dexterity. The advent of robotic-assisted laparoscopic surgery has transformed the field, offering improved visualization, tremor reduction, superior ergonomics, and enhanced precision. Over the past two decades, robotic platforms have expanded the scope of minimally invasive surgery. Robotic surgery has transformed gynecological care by enhancing precision, visualization, and surgeon ergonomics. It has expanded the scope of minimally invasive surgery, particularly for complex conditions like advanced endometriosis and gynecological malignancies. As technology advances, addressing cost and accessibility will be key to maximizing its global impact.

Key words: robotic; laparoscopic; gynecology

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Introduction:

Conventional two-dimensional laparoscopy was considered a game changing tool, for both the surgeon and patient in terms of surgical precision, enhanced vision, quicker post operative recovery and shorter hospital stays. However, the technology came with its limitations as the scope and skills of surgeons kept growing. The robotic platforms have added to the surgeon's armamentarium, enabling them to overcome these limitations.

Robot-assisted laparoscopic surgery has become a cornerstone of modern gynecology, offering improved depth perception, reduction in tremor resulting in unparalleled precision, superior dexterity, intuitive movements, autonomy of camera control, improved ergonomics, and hence has expanded capabilities for minimally invasive management of complex gynecological conditions. Over the past two decades, robotic platforms have redefined the surgical approach to challenging diseases such as advanced endometriosis, gynecological malignancies, and pelvic organ prolapse, delivering better outcomes while minimizing surgical morbidity. The evolution of robotic systems, particularly innovations such as Indocyanine Green (ICG) fluorescence imaging and augmented reality (AR), has further enhanced visualization, surgical planning, and multidisciplinary collaboration. This article provides a comprehensive review of the role of robotic surgery in gynecology, focusing on evidence-based outcomes, economic considerations, emerging technologies, and global perspectives, supported by systematic reviews and clinical studies.

History of Robotic Surgery

Although the term and existence of "robots'' is relatively new, the idea of autonomously operating machines can be dated for centuries. The term "robot" was conceptualized by Joseph Capek in 1921, in his play Rossom's Universal Robots, which originally came from the Czech word "robota", meaning "labor". The term rapidly became corrupted to reflect a machine-oriented repetitive task. Computer assistance, robotics, automation, and virtual reality are relatively new concepts, and more recently they have been applied to healthcare assistance. The last decades have witnessed an exponential growth in medical technology (1).

Robotic applications to surgery started in 1970s as military projects endorsed by the National Aeronautics and Space Administration (NASA) and funded by the Defense Advanced Research Project Administration (DARPA) in order to replace the surgeon's physical presence and provide care to astronauts or to soldiers in battlefields (2). Robotic surgery represents a pinnacle in minimally invasive techniques, integrating cutting-edge technology to enhance surgical precision. The evolution of robotic surgery can be traced back to its inception in the 1980s. The "da Vinci Surgical System" by Intuitive Surgical (Intuitive Co Sunnyvale, California, USA), introduced in the early 2000s, marked a watershed moment. Understanding the key components of robotic surgical systems is imperative for appreciating their efficacy in surgical management.

Surgeon's Console

The control center where the surgeon sits and manipulates the robotic arms with hand and foot controls.

Robotic Arms:

Articulating arms equipped with surgical instruments, allowing for precise movements during the procedure.

Endoscope and 3D Camera System:

High-definition, three-dimensional visualization is provided by the endoscope, enhancing the surgeon's depth perception.

Patient Cart:

The robotic system's mechanical arms and instruments are housed in the patient cart, which is positioned next to the operating table. I Evidence-Based Outcomes in Robotic Surgery Robotics in Benign Gynecology

Robotic myomectomy

The surgical steps and concept of abdominal myomectomy was first defined in 1931. The same was described using minimally invasive techniques (conventional laparoscopy) in 1979. The success of minimally invasive techniques served as the foundation for the development of robotic myomectomy (RM), which was accepted by surgeons. Since robotic platforms offer many benefits, are more intuitive, not requiring all the skills that are needed for conventional laparoscopy, they are particularly advantageous to surgeons with few or no laparoscopic expertise, particularly in suturing procedures. Myomectomy is a suture-intensive procedure, and the aid of a robotic platform reduces the learning curve for intra-corporeal suturing (3). One of first series of myomectomy that was reported in the literature using the Da Vinci robot was by Advincula et al., in 35 patients (4). The mean diameter of fibroids was 7.9 ± 3 cm, mean weight was 223 ± 244 g, and each patient had an average of 1.6 fibroids removed at the time of surgery. The conversion rate from robotic to laparotomy was 8.6%, comparable to that of conventional laparoscopic myomectomy. The study reported mean estimated blood loss to be 169 ± 198 ml with average operative times of 230 ± 83 min (5).

The pseudo capsule surrounding the fibroid is a fibro-neurovascular structure composed of a neuro-vascular network rich in neuro-fibers separating it from normal peripheral myometrium. The fibroid pseudo capsule is similar to the neuro-vascular bundle surrounding a prostate. This understanding of the neuro-vascular bundle in pseudo-capsule has brought in a concept of intra capsular fibroid nerve-sparing laparoscopic “microsurgery,” or intra capsular fibroid nerve-sparing robotic-assisted “nano-surgery,” with the help of robotic magnification.

Intra capsular myomectomy preserves the neuro-vascular bundle and neurotransmitters surrounding fibroids. This helps in better healing of myometrium, minimal adhesion and good postoperative scar integrity. Tinelli A. et al, propose that intra capsular myomectomy should always be recommended to maximize the potential for future fertility and to minimize the risk of labor dystocia or uterine rupture during subsequent pregnancy (6).

Robotic Benign Hysterectomy

Hysterectomy is the most commonly performed gynecological surgery in women world over. The first hysterectomy by conventional laparoscopy was described by Harry Reich in 1989 (7). However, 35 years down the line, open abdominal hysterectomy still remains a very common surgical technique. This applies not only to India but to United States of America as well. Most investigators consider higher costs per procedure secondary to lengthier operative time and disposable equipment.

Louis Lenfant et al, made a head-to-head comparison of all routes of hysterectomy for benign conditions: laparoscopic, robot assisted, vaginal and abdominal. It was a systematic

review and meta-analysis across various platforms (8).

They concluded that, while the robotic approach was mostly comparable to the laparoscopic route, it was associated with a shorter length of stay, less estimated blood loss, and fewer complications when compared to the open approach. In comparison to the vaginal approach, the robotic route was associated with longer operative time but shorter length of stay and less estimated blood loss. The robotic approach could be an opportunity to offer the peri-operative benefits of minimally invasive surgery to patients who in the past would have been suitable only for an open approach, thus broadening the surgical armamentarium for benign hysterectomy (8).

Robotics in Advanced Endometriosis

Advanced endometriosis remains one of the most challenging conditions to treat surgically. The disease frequently infiltrates critical structures such as the bowel, bladder, ureters, and diaphragm, necessitating complex surgical excision. Robotic platforms have proven particularly effective in addressing these challenges by offering enhanced visualization. The magnified, three-dimensional immersive vision improves the surgeon's ability to identify and excise microscopic endometriotic implants.

The 3D camera is secured and controlled by the surgeon, reducing dependency on a proficient assistant surgeon. To overcome lack of stereoscopic vision in conventional 2D laparoscopy, 3D cameras were developed. Although the benefits of 3D cameras are well documented, the surgeons' console vision in robotic-assisted surgery might make the operative strains reported when using a 3D camera in conventional laparoscopy, such as headache, dizziness and eye strain, less severe (9,10).

The improved ergonomics of the robotic platforms cannot be overlooked. Studies have reported the advantages of articulating instruments as well as intuitive movements of the surgeon’s fingers using abdominal models representing a healthy weight range (BMI 18.5–¬ 24.9 kg/m2) and those with obesity (WHO classification BMI 30 kg/m2 or over) (11). Articulated instruments and the intuitive console reduce surgeon fatigue, ensuring sustained precision during long, intricate procedures. In Deep Infiltrating Endometriosis (DIE) specifically, robotic assisted surgery is an enabling tool that may allow surgeons to perform excisions more easily and safely, especially as nerve sparing and focus on the pathology of the pelvic nervous system (neuro-pelveology) becomes imperative (12). In a study, Nezhat et al compared out comes of deep infiltrating endometriosis surgery in 86 patients (conventional laparoscopy) v/s 32 robot assisted surgeries They concluded that despite a higher operating room time, robotic-assisted laparoscopy appears to be a safe minimally invasive approach for patients, with all other peri-operative outcomes, including intra-operative and postoperative complications, comparable with those in patients undergoing conventional laparoscopy (13). The more one can see, the better the result of excision surgery. Mabrouk et al. (2015) reported spontaneous conception rates exceeding 50% following robotic excision in infertile patients, highlighting its efficacy in restoring reproductive function (14).

Deep Infiltrating Endometriosis: Our Perspective & Surgical Technique

This review would be incomplete without sharing our own practical experience on deep infiltrating endometriosis and bowel endometriosis. Deep endometriosis surgery demands a nuanced approach, considering the intricate involvement of pelvic and extra pelvic organs. The surgical techniques employed encompass a spectrum of procedures, each tailored to address the specific challenges posed by deep infiltrating lesions. Excisional surgery, involving meticulous removal of endometriotic tissue, is the cornerstone in the management of deep endometriosis. This may involve:

1.Nodule Excision:

Targeted removal of deep nodules infiltrating pelvic organs, such as the rectum, bladder, or utero-sacral ligaments (15).

2.Peritoneal Shaving: Delicate excision of endometriotic lesions from the peritoneum, preserving surrounding healthy tissue (16).

3.Nerve-Sparing Techniques: Preservation of pelvic nerves during surgery to mitigate the risk of postoperative pain and dysfunction (17).

Our technique:

The patient is placed in the traditional position for laparoscopic surgery with the legs in Allen stirrups with the minimal amount of flexion at the hip and knee joints.

The primary incision is made at the umbilicus or the Lee Huang point depending on the patient's body habitus, the size of the uterus in case of a concomitant hysterectomy or the anticipated need of a colorectal resection.

Prior to beginning the procedure, a cystoscopy is performed and both ureteric orifices are identified. Indo Cyanine Green (ICG) dye is injected into both ureters using a ureteric catheter through the cystoscope. The dye will stay in the ureters for approximately four to five hours and will help in identifying the ureters with the da Vinci's firefly mode, without having the hindrance of stents (Fig. 1).

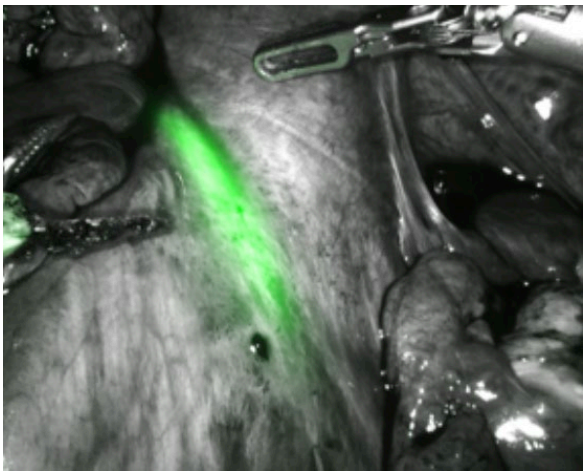

Figure 1: Intra-ureteric ICG delineating the right ureter in FireFly mode

A Veress needle is used to create pneumoperitoneum and an optical entry technique is used with a 5 mm 0-degree laparoscope placed through the optical trocar of the robotic cannula. Once entry is confirmed, the 30-degree robotic telescope is used to perform a thorough inspection of the abdomen and pelvis. Both domes of the diaphragm are closely examined for any endometriotic lesions. It is important to use the angled scope to push down the liver and inspect the diaphragm behind it for any endometriotic lesions (Fig. 2). The rest of the abdomen is surveyed including the stomach, small intestine, cecum, appendix and large intestine.

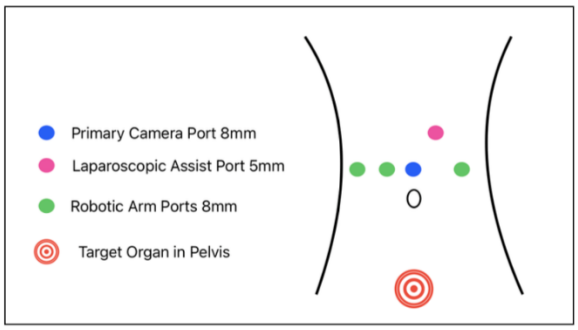

Figure 2: Port placement with the da Vinci X Surgical System.

The other robotic ports are placed under vision in a linear fashion. two ports on the right and one port on the left. A 5mm or 12mm assistant port is placed between Arms one and two (Fig. 3).

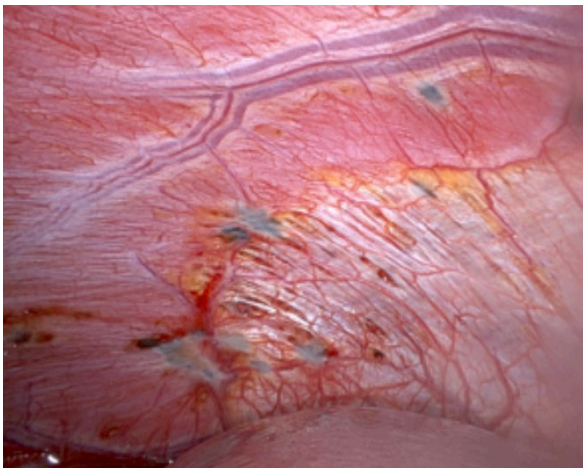

Figure 3: Diaphragmatic Endometriosis seen using a 30° robotic scope

After port placement the patient is placed in steep Trendelenburg position and the small bowel is pulled out of the pelvis and the uterus is anteverted to enable a complete survey of the pelvis. The robot is then docked from the patient's right side and instruments are placed. traditionally a long bipolar forceps, monopolar shears and a prograsp for most of the dissection are used.

Preparation begins by mobilizing the sigmoid colon from its congenital adhesions to the pelvic sidewall. This may be performed all the way up to the splenic flexure if a segmental bowel resection is planned. This mobilization gives direct visualization of the left ureter which can be confirmed via the Firefly mode by identifying the bright green of the ICG dye.

Ureterolysis can be performed up to the adherent ovary. In case if an endometrioma; it is drained and decompressed after inevitable rupture during ovariolysis from the pelvic sidewall. Once the ovary is completely mobilized it is elevated and a temporary ovariopexy is performed to the lateral wall using a straight needle suture or a T lift device. The same procedure is repeated on the right side. Ureterolysis is completed after fixation of the liberated ovaries up to the intra-ligamentary portion. Endometriotic lesions form the peritoneum and uterosacral ligaments can now be safely excised. In case of obliteration of the pouch of Douglas by a recto vaginal nodule, one must begin dissection of the para-rectal spaces laterally and then advance along those avascular spaces up to the nodule. In case a segmental resection is planned it is important to enter the avascular Total Meso- Rectal Excision (TMRE) plane to mobilize the bowel. This is a nerve sparing technique which provides direct visualization of the hypogastric nerves and enables us to move them away laterally.

The midline dissection is the trickiest part of the dissection since it involves cutting through the nodule leaving some portion on the uterine torus and some portion on the rectum, both of which are excised after the dissection is completed and the Pouch of Douglas is entered. A speculum examination should have been performed prior to beginning the procedure to rule out infiltration of the vagina. In case vaginal infiltration is present a colpotomy is made and the affected vagina is excised.

Rectal Endometriosis - Preoperative evaluation is a must. Endometriosis surgery requires a thorough and complete evaluation of the rectum. Rectal nodules can be easily diagnosed on a Trans Vaginal Sonography (TVS) or an MRI provided the imaging is performed by or interpreted by an expert. For low rectal nodules, the robotic approach offers us an invaluable advantage. Deep shaving is optimized due to the stable camera and fine instrumentation. In some cases; a low anterior resection may be avoided using the robotic platform as compared to a laparoscopic approach. This may have tremendous advantages for long term patient outcomes as well as reducing complication rates.

For single rectal nodules, less than five cm in length, not infiltrating a circumference more than 1/3rd of the bowel or causing sub-occlusion of the lumen – it is possible to perform a discoid resection with a circular stapler. Shaving is reserved for smaller nodules not infiltrating deep into the muscularis. The limitations with shaving are that it is not a standardized technique and the endpoint is subjective. The recurrence rates may be higher when compared with the other full thickness excision techniques.

Shaving techniques appraisal:

- Excision of rectal lesions without entering the lumen
- Low rate of complications.
- Low rate of functional outcomes or nerve damage
- Long term recurrence is probably higher
- First line technique when feasible

Shaving with the da Vinci robot is much easier when compared with traditional laparoscopic techniques because of the clarity of vision and steadiness of the camera, as well as the fine tipped instruments which allow layer by layer dissection of the rectum and the dexterity of the instruments which allow us to approach the nodule from different directions (Fig. 4).

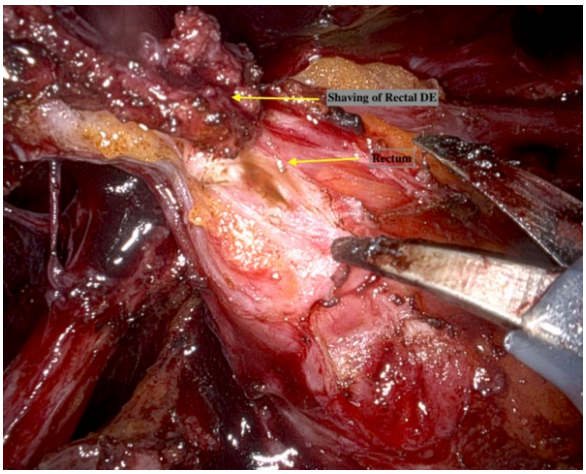

Figure 4: Rectal shaving

Discoid Resection: It is an interesting procedure for a full thickness excision of the anterior wall of the rectum. It can be used for single nodules less than four cm in diameter with less than 1/3rd circumference infiltration and/or sub-occlusion. The bulk of the nodule is shaved to reduce the size of the disc. A suture is placed proximal and distal to the nodule. An appropriately sized End to End Anastomosis (EEA) circular stapler is inserted trans-anally with the anvil in place and introduced into the pelvis under vision.

The stapler is then opened and the 2 ends of the suture are used to push the nodule into the open stapler. The stapler is then anteverted and closed ensuring that the nodule remains within and then fired. The stapler is then released and extracted and the specimen is examined to confirm the complete excision of the nodule. Safety tests are performed by insufflation with air and methylene blue / ICG. Segmental Resection: segmental resection anastomoses are reserved for bowel endometriosis in specific conditions:

1.Nodules causing sub-occlusion where a discoid excision is not possible

2.Single nodules infiltrating a length of more than five cm.

3.Multiple nodules in close proximity to each other.

4.Nodules extending more than 1/3rd circumference of the bowel.

5.Sigmoid colon nodules.

6.Small bowel or ileo-caecal endometriosis.

Procedure:

When feasible segmental resection and anastomosis is carried out via Natural Orifice trans-luminal Specimen Extraction techniques (NOSE). These can be performed via three routes

1.Trans-vaginal – When performed in conjunction with a hysterectomy the open vagina can be used to introduce the anvil and as a route to extract the specimen. In some cases, it may be feasible to exteriorize the affected bowel through the open vagina but if this is not possible then the procedure can be completed easily enough via an intra-corporeal technique.

2.Trans-colpotomy – In cases when there is vaginal infiltration and a vaginal nodule must be excised the posterior colpotomy resulting from this procedure can be used to introduce the anvil as well as extract the specimen.

3.Trans-anal approach – In cases where there is no vaginal infiltration and there is no simultaneous hysterectomy being performed an enterotomy is made proximal and distal to the affected length of bowel. The anvil of the EEA stapler with the spike in place is introduced via the caudal enterotomy (Fig. 5). The anvil is then introduced through the cranial enterotomy and the spike is maneuvered to pierce the anti-mesenteric border of the proximal colon. A linear stapler is used to disconnect the bowel below the anvil. The spike is then disconnected and retrieved by the bedside assistant port (Fig. 6). The resected bowel is then disconnected and the specimen is retrieved through the distal rectum which is then staple closed. Finally, the side to end anastomosis is performed as per standard procedure.

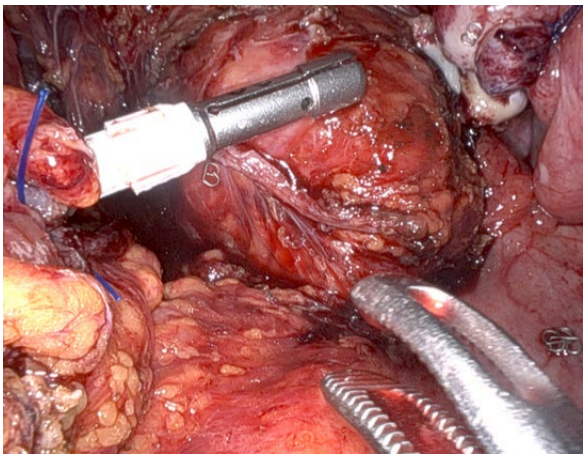

Figure 5: Anvil of Circular Stapler

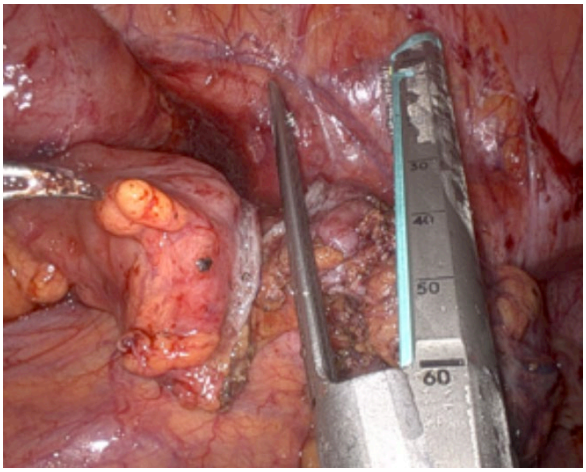

Figure 6: Linear robotic stapler trough a 12 mm robotic port.

Robotics in Gynecological Oncology

Robotic surgery has become a mainstay in the treatment of gynecological malignancies, particularly in endometrial and cervical cancers. Women with endometrial cancer often present with co-morbidities, such as severe obesity, diabetes or hypertension (18). The platform's

ability to facilitate comprehensive staging, including lymphadenectomy, while minimizing surgical morbidity has made it a preferred choice for both patients and surgeons. Corrado et al. (2018) analyzed over 5,000 cases of robotic hysterectomy, reporting oncologic outcomes comparable to open surgery with significantly reduced complications, shorter hospital stays, and faster recovery (19). Over the past two decades Minimally Invasive Surgery (MIS) techniques have gained widespread acceptance as an approach to radical hysterectomy for cervical cancer (20). A meta-analysis assessing robotic assisted surgery for radical hysterectomy in cervical cancer concluded there were fewer complications using the robotic platform compared with open surgery (21). Nie JC et al. (2017) noted that robotic radical hysterectomy in early-stage cervical cancer led to superior peri-operative outcomes compared to laparotomy, including lower wound infection rates and reduced blood loss (22).

Robotics in Pelvic Organ Prolapse Surgery

Pelvic Organ Prolapse (POP) significantly impacts a woman's quality of life and robotic-assisted sacrocolpopexy / Sacro hysteropexy are now emerging as the gold-standard surgical approach for advanced cases. However, the role of the robotic platform has expanded to include colposuspension, management of vesico-vaginal fistula and mesh/suture complications (23). The robotic platform provides greater precision and access to the deeper spaces and planes in the pelvis. Most Urogynecological surgeries being suture intensive, the seven degrees of freedom along with the articulating instruments are definitely favorable to enhance surgical experience. The superior ergonomics result in lower error rates and shorter learning curves for Urogynecological procedures (24,25). Paraiso et al., 2017 demonstrated long-term success rates exceeding 90%, with lower rates of prolapse recurrence and mesh erosion compared to vaginal approaches (26). Kim JH et al. (2020) demonstrated fewer intra-operative complications and faster recovery time with robotic sacrocolpopexy compared to laparoscopic techniques (27).

II Innovations in Visualization: Indo-cyanine Green and Augmented Reality

(a) Indo-Cyanine Green (ICG) Imaging

ICG fluorescence imaging has become an integral component of robotic gynecological surgery, enabling superior visualization of critical structures and reducing rates of surgical complications. Ureteral Visualization: Conditions such as deep infiltrating endometriosis and patients who have had recurrent disease requiring multiple surgeries have altered surgical anatomy and poor surgical planes for dissection. The power of 'predictive anatomy' cannot be applied in such surgeries. There in comes the use of intra-ureteric instillation of ICG which allows the surgeon to visualize the entire ureter along its course during crucial dissection to restore normal anatomy. ICG allows precise identification of the ureters during complex pelvic surgeries, reducing the risk of iatrogenic injury. Yoshida et al. (2019) reported that ICG reduced ureteral injury rates by 25% in gynecological surgeries (28).

By giving an intravenous bolus ICG can be used to confirm good vascular supply to the ureter after a difficult ureterolysis; ruling out thermal / ischemic damage.

•Bowel Anastomosis: an intravenous bolus of diluted ICG helps identify vascular perfusion post dissection and / or anastomosis. It is used in cases of bowel endometriosis after resection-anastomosis of the recto-sigmoid. It ensures

adequate perfusion at the anastomotic site which is critical in bowel resections. ICG imaging confirms vascular supply in real-time, reducing anastomotic leak rates. Chan D. K. H. al. (2020) found that using ICG in robotic bowel resections lowered anastomotic leak rates by 50% (29).

•Sentinel Node Mapping: ICG enables real-time identification of sentinel lymph nodes (SLN) in gynecological cancers, minimizing the need for extensive lymphadenectomy and reducing complications such as lymphedema. Para-cervical instillation of diluted ICG just prior to starting the surgery, helps identification of the sentinel lymph node. This in turn reduces the morbidity of the surgery, operative time and need for prolonged anesthetic medications. Jewell et al. (2014) demonstrated a 95% detection rate for SLNs using ICG in endometrial and cervical cancer surgeries (30).

(b) Augmented Reality (AR)

AR technology offers a transformative addition to robotic surgery, allowing real-time integration of anatomical maps with the surgical field.

•Enhanced Surgical Planning: Surgeons can visualize critical structures such as blood vessels, ureters, and lymph nodes during surgery, improving safety and efficiency. This avoids inadvertent iatrogenic damage to vital tissues and augments the principle of vessel sparing and nerve sparing surgery.

•Dynamic Intra-operative Guidance: AR overlays guide surgeons to key anatomical landmarks, such as sentinel nodes, while avoiding unnecessary dissection. This not only reduces the morbidity of the surgery but also shortens surgical time and avoids need for prolonged anesthetic medications.

•Integration with ICG: Combining AR with ICG fluorescence provides unparalleled visualization, enabling real-time confirmation of tissue perfusion, lymphatic mapping, and tumor margins. As AR technology matures, its integration with robotic systems is expected to further improve outcomes, reduce operative times, and enhance safety in complex gynecological procedures.

III Multidisciplinary Collaboration

Robotic systems provide a unique platform for seamless multidisciplinary collaboration, particularly in cases involving advanced endometriosis. The enhanced precision and stability make robotic surgery particularly suited to operating in areas with challenging access, such as the pelvis, which has led to a rising number of colorectal resections being performed robotically (31). Robotic platforms facilitate precise ureterolysis and bladder repair, which can be challenging with conventional laparoscopy. Urologists have taken on the robotic platform and are more comfortable suturing robotically than with conventional laparoscopy. The articulated instruments and consistent surgical setup enable efficient bowel resections and anastomoses, even in the narrow confines of the pelvis. Colorectal surgeons are using robotic staplers which articulate and enable lower resections of the recto-sigmoid.

As coordinators of care, gynecologists leverage the robotic system to manage the primary disease while ensuring effective contributions from other specialists. Farr Nezhat et al. (2023) reported improved outcomes in advanced endometriosis surgeries performed collaboratively with urologists and colorectal surgeons using robotics, with significantly lower complication rates (33).

IV Post Operative Pain Relief & Analgesia Management

Despite the port sites being 8 mm in robotic surgery, the port site pain is expected to be lesser than conventional straight stick laparoscopic surgery. This may be due to less torquing at the level of the abdominal wall through the operative ports as majority of the movement happens within the abdominal cavity at the tip of the instrument (endo-wrist movement) In conventional laparoscopy, the abdominal wall port site is used as the point of fulcrum for all movements, resulting in greater post operative pain. Shashoua et al (2009)evaluated narcotic usage and found that the robotic procedures required fewer units of post operative narcotic usage (34).

V Economic Considerations

Robotic surgery is frequently criticized for its high costs, but evidence suggests that its long-term value may offset these initial expenses. It is important to consider that costs should decrease with time once surgical expertise increases (shortened operating time), high-volume robotic centers are introduced, hospital stays reduce and MIS increases. Also, the cost and time implications associated with laparotomy complications should also be considered (35-37). While one debates and questions the justification of added costs, one must consider the long-term value over short term cost. Wright et al. (2019) found that robotic surgery reduced postoperative complications and hospital readmissions, lowering overall healthcare costs by 15% over one year (38). As robotic surgery spreads its arms across intuitions and multidisciplinary fields, one can expect improved efficiency in high-volume centers. Sandberg et al. (2020) noted that centers performing high volumes of robotic procedures achieve better cost-effectiveness due to streamlined workflows (39). Global accessibility of the technology remains a glaring challenge. Low resource settings would face hurdles and barriers in meeting with high upfront costs and this limits the adoption of the robotic platforms in Low- and Middle-Income Countries (LMIC). This can be overcome by the enforcing subsidized programs and developing mobile robotic units that can improve accessibility of the technology.

VI Training and Surgeon Learning Curve

Simulation based training provides surgeons the ability to visualize intra-operative scenarios and troubleshoot through different potential complications enabling them to refine their skills in a controlled and safe environment, increasing their accuracy and gaining crucial experience. Lenihan et al. (2017) studied and then emphasized the importance of standardizing robotic surgery training, combining didactic sessions with hands on simulator or cadaveric practice (32). Currently, the general consensus is that a curriculum should consist of steps ranging from e-learning lectures to simulation and cadaveric training to supervised operating and finally, to approval for independent practice. (32,40,41). The lack of haptic feedback on the robotic platforms; necessitates the development of visual cues which is imperative while transitioning from conventional laparoscopy to robotic assisted laparoscopic surgery. There is debate as to whether previous laparoscopic experience is desirable or necessary before beginning robotic training.

Andolfi and Umanskiy suggest that prior proficiency in the operation itself is important but that whether this is laparoscopic or open makes no difference (42). The endo-wrist technology allows surgical maneuvers that are similar to open surgical techniques, thus making it easy for surgeons with less advanced

laparoscopic skills to learn and perform difficult tasks like intra corporeal suturing and knot-tying (43). Studies suggest that 50-70 cases are required to achieve proficiency in robotic surgery, with benefits including reduced operative times and complications over the long term. The availability of a dual console enables collaboration and facilitates teaching (44). A structured training program for robotic surgery is essential. Robotic surgical training programs consisting of two components - generic robotic skills and specialty specific skills - have been developed to introduce Robotic-Assisted Laparoscopy (RAL) programs safely (45). A study by Rajan Babu A, et al showed that robotic surgery has lots of scopes for surgical improvement beyond its first and second years or beyond the first 200 cases. Further evaluation is required to see whether OR times can be reduced further and what is the time /number of cases required for a surgical team to reach its peak performance (46).

VII Future Directions in Robotic Surgery

Artificial Intelligence (AI):

A space which can be advanced by AI is in the case of real-time decision support where multiple AI algorithms can guide surgeons in identifying surgical planes, highlighting the involved anatomy and improving precision. Another area which can be improved with AI is the use of predictive modelling, where patient details and scans can be input into the AI algorithm and the output would help predict specific anatomical anomalies and potential complications which would in turn enhance intra operative safety.

Telemedicine and Remote Surgery:

Remote surgery has the potential to have the largest impact and is a lucrative topic to take forward as it has the ability to bridge the gap between highly populated, underserved areas with experienced robotic surgeons able to complete complex surgeries from miles away by combining robotic surgery with telemedicine. This would involve high-speed internet connections to enable surgeons to perform procedures on patients in different locations.

Conclusion:

Robotic surgery has emerged as a transformative force, revolutionizing the management of complex gynecological and pelvic conditions. It offers unmatched precision, enhanced visualization through innovations like ICG imaging and AR, and facilitates effective multidisciplinary collaboration. Needless to say, better ergonomics result in improved comfort for the surgeon, enabling one to maintain the quality of surgical art for longer hours. These advancements have expanded the scope of MIS, particularly in complex and tedious cases such as advanced endometriosis and gynecological malignancies. By addressing challenges related to cost, training, and accessibility, robotic surgery has the potential to become a universe.

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Trans abdominal cerclage for cervical incompetence: a simplified laparoscopic approach Result of 104 cases continuous series

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Abstract

A definitive cervical cerclage, particularly a transabdominal cerclage (TAC), is a surgical intervention aimed at preventing late miscarriages and preterm labor in women with cervical insufficiency. This condition, often associated with recurrent late miscarriages or preterm births, can be challenging to manage, especially when conventional treatments such as progesterone or McDonald cerclage fail. While traditional guidelines typically recommend TAC only after multiple failed pregnancies despite cervical intervention, recent developments suggest that it may be beneficial in women with fewer previous miscarriages, particularly when a minimally invasive, effective, and reliable technique is available. This study reviews the outcomes of 70 patients who underwent laparoscopic TAC between 2018 and 2023, emphasizing a simplified technique that reduces operative time and minimizes complications. TAC before pregnancy was found to significantly improve pregnancy outcomes, with a high success rate and low complication rate, including in cases of concurrent endometrial conditions such as chronic endometritis.

The study also highlights the benefits of early intervention and the potential for expanding the indications for TAC, especially for women with one or two prior miscarriages. Our results suggest that, with careful patient selection and informed decision-making, TAC can be a valuable tool in preventing recurrent late miscarriages and improving pregnancy outcomes in women with cervical insufficiency.

Key words: Laparoscopy, cerclage, surgery, miscarriage, endometritis

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Introduction:

Cervical insufficiency affects up to 1% of the population and is a leading cause of late miscarriage between 14 and 23 weeks of gestation or premature labor. Diagnosis of cervical insufficiency is challenging as no specific diagnostic test exists, except in cases such as previous trachelectomy or extensive cone biopsy. Many examinations only prove to be inconclusive during pregnancy, making the patient's obstetric history a crucial component of the diagnostic process. Treatment options during pregnancy are limited to progesterone or cerclage, both of which demonstrate suboptimal success rates. Classical vaginal cerclage procedures, such as McDonald or Shirodkar, are often proposed at the end of the first trimester, but their efficacy remains limited. An alternative approach, known as "definitive cerclage," has been suggested either via a vaginal route (supracervical cerclage) or transabdominal route, the latter first described by Benson in 1965 (1). Trans Abdominal Cerclage (TAC) can be performed by laparotomy but is increasingly performed laparoscopically, sometimes with robotic assistance. In this article a simplified laparoscopic TAC technique is described. Traditionally, indications for definitive cerclage have been rare, typically offered only after two late miscarriages, plus a third miscarriage following a McDonald or Shirodkar cerclage performed at 12 weeks' gestation. However, by proposing a simpler, faster, reliable, and minimally invasive technique, it is believed that indications for TAC could be expanded to include patients who have experienced one or two late miscarriages or a McDonald cerclage failure.

Materials and Methods:

Patients: Between 2018 and 2023, 104 patients underwent laparoscopic cerclage using our simplified technique. Initially. The procedure has been limited to patients who had experienced three late miscarriages, but the indication was expanded to patients with one or two miscarriages after recognizing the profound emotional toll these events had on patients (Table 1).

After 1 late miscarriage	After 2 miscarriage	After 3 or > miscarriage
15 (14.,**4%)**	26**(**25,0**%)**	63**(**60**,%)**

Table 1: Indications

All patients were informed that cesarean delivery would be required after the procedure. Patients were given a period for reflection, and written informed consent was obtained. While the aim was to perform the laparoscopic cerclage before a new pregnancy, some procedures were performed during the first trimester.

Surgical Method: The operation stated with a diagnostic hysteroscopy to identify and treat any intra cavitary abnormalities, and an endometrial biopsy was performed to assess for Impaired Inflammatory State of the Endometrium (IISE). A Hegar dilator No. eight was introduced into the cervix to facilitate spontaneous uterine evacuation or aspiration in cases of early miscarriage up to 13 weeks' gestation. The dilator was also useful for uterine manipulation. Laparoscopy was initiated with a ten mm umbilical optical trocar, along with three five mm trocars for instrumentation in the lower abdomen. Following inspection, the peritoneum of the anterior cul-de-sac was opened, and a limited bladder dissection was performed to access the isthmus (Fig 1 to 5.)

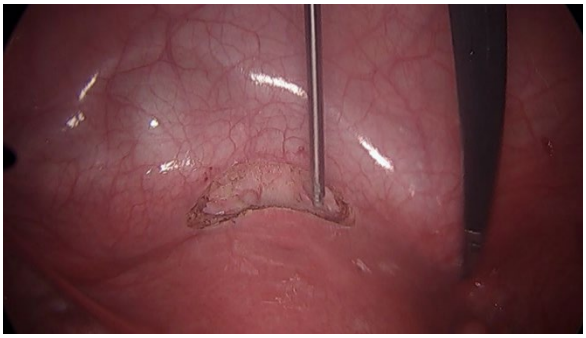

Figure 1: Opening of the anterior cul de sac and the percutaneous insertion of the EndoClose needle

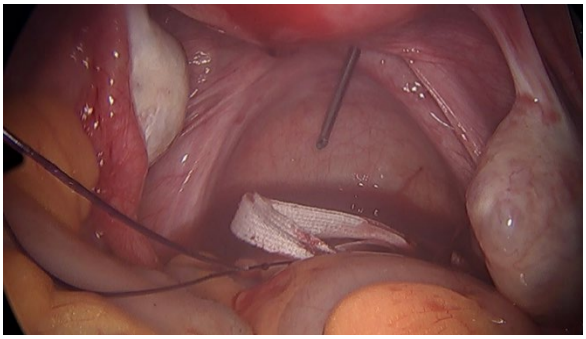

Figure 2: EndoClose is passed just above the uterosacral ligament and will take the thread attached to the mesh

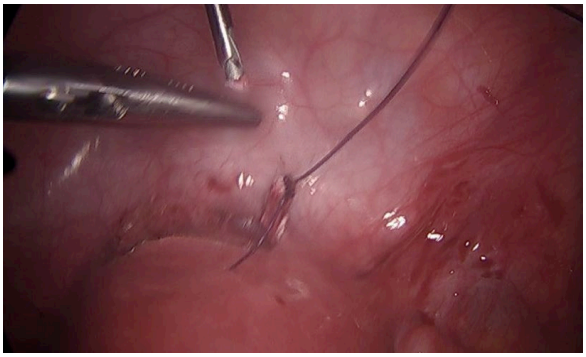

Figure 3: the mesh is passed laterally, the same procedure is performed on the right

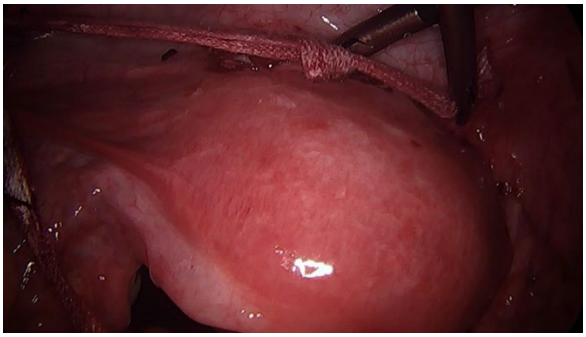

Figure 4: the anterior knot is closed.

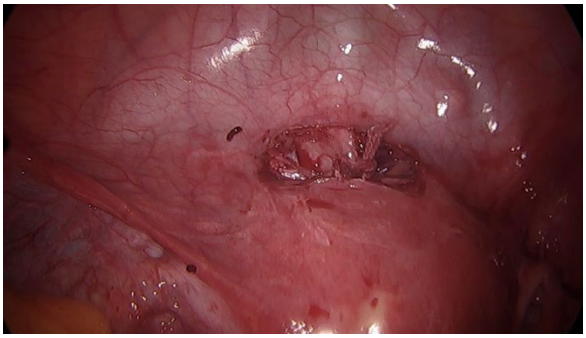

Figure 5: end result before cul de sac peritonialization

A Mersilene® mesh was introduced into the abdomen via a lateral port and left in the pouch of Douglas. An EndoClose® needle (Medtronic, Dublin, Ireland), a needle with a mobile eye for insertion of the tread, was used. The needle was introduced percutaneously just above the uterine isthmus and inserted in the cervix on the inside the uterine vessels. The needle then passed into the pouch of Douglas without requiring tunnel dissection, shortening the procedure. The needle was opened, and one end of the mesh was inserted. The process was repeated on the opposite side. Any minor bleeding that occurred typically resolved after knotting the mesh. The mesh was tied anteriorly, and the peritoneum was closed using Monocryl® 0 (Ethicon, New Jersey, USA), completing the procedure. The obstetricians were instructed not to remove the mesh during cesarean section, allowing for multiple pregnancies if desired.

Results:

As many patients (n=59) were living outside of the region (Rhône, France) a web-based survey to assess mid- and long-term outcomes was conceived. 59 patients received the questionnaire. The outcomes of the other patients were already known(N-45). Of the 59 patients in the first group, 45 (76.3%) responded to the questionnaire, 14 patients were lost to follow-up. The average patient age was 28 years (range: 23–38 years). Before TAC, 15 patients had experienced one late miscarriage, 26 had two miscarriages, and 63 had three or more miscarriages. Additionally, 45 patients (63.3%) had previously undergone Shirodkar or McDonald cerclage in a prior pregnancy, with 11requiring emergency cerclage between 17–20 weeks. All of these patients experienced a preterm delivery, with only one newborn surviving (delivered at 23 weeks). In total, 101 TAC procedures have been performed prior to a pregnancy and three during pregnancy (eight to ten weeks' gestation). Concurrent hysteroscopy was performed in 101 patients, with IISE detected in 18 cases (17.8%). These patients received a one-month course of antibiotics (minocycline) before attempting pregnancy. Patients were routinely advised to avoid getting pregnant for one-month post-surgery. Most patients were discharged on the same day or the day after surgery. The average laparoscopic time was 14 minutes (range: 10–23 minutes) in non-pregnant patients without associated pathology. In pregnant patients, the operating time was 30, 44, and 29 minutes, corresponding to ten (n:2) and 8 weeks of pregnancy, respectively. Out the 104 patients, three experienced minor complications, including scar defects that required nursing care. During laparoscopic TAC, the following associated conditions have been treated: endometriosis (n=7; five stage II, and two stage I according to the AFS classification), myoma removal (n=3), and extensive adhesiolysis (n=7). Aside from the extended operating times, these conditions did not result in any significant complications.

Pregnancy Outcomes:

Among the 45 patients who responded to the survey, 36 became pregnant following TAC (80%). Among the 49 other patients 39 became pregnant (79,5%). In all, three patients were pregnant at the time of the operation and 75 after cerclage (74,2%). Ten patients experienced first-trimester miscarriages (10/101= 9,9%): seven spontaneous expulsions and three requiring aspirations. The cerclage did not present an obstacle in any of these cases. No ectopic pregnancies occurred. Three patients opted to postpone a pregnancy for personal reasons. One patient delivered at 23 weeks due to chorioamnionitis and required cesarean delivery. Fortunately, the newborn survived. Another patient who underwent TAC at ten weeks with a twin pregnancy developed spontaneous labor at 20 weeks due to a myoma near the isthmus. After an unsuccessful attempt to remove the cerclage, a cesarean section was performed. In a later stage a laparoscopic myomectomy was performed and the TAC repeated. This patient eventually delivered a healthy baby at 37 weeks. In other pregnancies, cesarean sections were performed at 34 weeks in 4 patients, 35 weeks in 2 patients, and at 37 weeks in 59 patients (90,7%). All of the newborns, 61(twin pregnancies n=2) appeared to be healthy. Two patients experienced a second successful pregnancy without complications; their cerclage remained functional, and both delivered at over 38 weeks via cesarean section (Table2).

Pregnant N=78			Not pregnant	Early miscarriage	Lost to Follow up
<34 weeks	>34<37 weeks	>37 weeks			
2	6	70	0	10	14
		2 (second pregnancy)			

Tabel 2: Outcome after Trans Abdominal Cerclage (TAC) (n=104)

Discussion:

This study describes a simplified TAC technique. Although retrospective, our series is larger than previously published reports (2-4). In non-pregnant patients, the operative time was significantly shorter compared to published techniques, which average 35–65 minutes, surgery time being even longer with robotic assistance (5). Performing TAC before pregnancy is preferred, as it facilitates easier dissection and uterine manipulation, with clearer landmarks visible (6,7). This approach is consistent with previous studies (8) and results in shorter procedures compared to surgeries performed during pregnancy (14 minutes vs. 30 minutes on average). Additionally, pre-pregnancy TAC enables concurrent hysteroscopy, which detected IISE in 17.8% of the cases. Although one case of chorioamnionitis at 23 weeks was confirmed, identifying IISE preoperatively may reduce the risk of chorioamnionitis. Our simplified technique also ensures that the cervix is not completely sealed, allowing for uterine evacuation in cases of first-trimester miscarriage.

Alternative approaches include supracervical cerclage via the vaginal route at the end of the first trimester (9,10). However, due to complications such as infection and bleeding, we favor the laparoscopic approach. Moreover, laparoscopic TAC is performed at a higher level than the vaginal techniques, which may explain its positive outcome even when the cervix is short or absent, as seen after trachelectomy. Several studies support the superiority of laparoscopic approaches over vaginal approaches (2). Some argue that laparoscopy may hinder future pregnancies, but our data show a 91.1% pregnancy rate, consistent with the published literature. Moreover, the delivery of 39 healthy babies (95.1%) out of 41 pregnancies supports the efficacy of our simplified approach (11). While laparotomy remains an option, laparoscopy provides equivalent results with less invasiveness and should be favored (8).

Conclusion:

TAC is a valid option for preventing preterm labor and late miscarriages. Our simplified technique is fast, reliable, and minimally invasive. With proper patient counseling and shared decision-making, TAC may be considered after one or two late miscarriages. The necessity of cesarean delivery is a minor inconvenience compared to the benefits of the procedure.

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Pelvic inflammatory disease in postmenopausal women - is that common?

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Abstract

This article presents two cases in which clinical and imaging findings were suggestive of pelvic inflammatory disease (pelvic abscess) but the final diagnosis revealed a pelvic malignancy. The authors reviewed all English written articles published in PubMed from January 1996 to June 2024. Current evidence does not establish pelvic inflammatory disease as a definitive risk factor for ovarian cancer. However, several studies show that postmenopausal women with pelvic inflammatory disease present a higher risk of associated malignancies. Clinical, ultrasound and intraoperative findings of a tubo-ovarian complex/abscess may mimic epithelial ovarian carcinomas and in case of surgery, particularly in postmenopausal women, intraoperative frozen section is strongly advisable. In postmenopausal women unresponsive to medical therapy, the surgical team should include at least one specialist trained in gynecologic oncology interventions.

Key words: differential diagnosis, ovarian cancer, pelvic inflammatory disease

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Introduction:

Pelvic inflammatory disease (PID) is an infection of the upper genital tract, including the uterus, fallopian tubes, ovaries and often affects adjacent organs. One possible serious complication is the development of pelvic inflammatory masses that may manifest as an “agglutination” of the affected anatomical structures (tubo-ovarian complex) or a collection of pus involving infected structures (tubo-ovarian abscesses) (1). Clinical and ultrasound presentation of a tubo-ovarian abscesses can closely resemble ovarian cancer. Clinically, both can manifest with pelvic pain, adnexal mass palpable on gynecological examination and/or abdominal distension. Sonographically, both conditions can present as a multilocular or multilocular-solid, highly vascularized adnexal mass with septations and internal echoic content consistent with inflammatory debris (2,3). Additionally, an elevated cancer antigen 125 (CA125) level can be observed in both conditions (4,5).

In this article, the authors present two cases in which the clinical and imaging findings, initially indicative of PID, obscured the underlying diagnosis of ovarian cancer. An extensive review of the literature was conducted in PubMed for similar cases published in English from January 1996 to June 2024. From the 507 articles identified by using the search term combinations "pelvic inflammatory disease” AND “ovarian cancer" AND "tubo-ovarian abscess” AND “ovarian cancer" the authors selected 20 articles considered relevant for the purpose of this review.

Case Report 1

A 70-year-old nulliparous woman with a history of ovarian endometriosis, was submitted to a hysteroscopy in the context of a symptomatic endometrial polyp diagnosed by ultrasound (29 mm x 18 mm x 35 mm). Histological evaluation revealed a benign endometrial polyp.

Two weeks after the procedure the patient presented in the emergency department with acute pelvic pain and fever (38.5ºC). Bimanual palpation was painful and purulent leukorrhea was evident on physical examination. Laboratory tests showed white blood cells (WBCs) count of 12,000/µl with 83% of neutrophils, C-reactive protein (CRP) 250 mg/L. Pelvic ultrasound identified an anteverted uterus, with a FIGO 2-5 posterior fibroid and endometrial polyp with 25 mm x 12 mm x 33 mm color score 3. In the left adnexal area adjacent to the uterus, a multilocular-solid cystic formation (7 locules), with “ground glass” content and a color score 3 with 84 mm x 67 mm x 70 mm was identified (Figure 1). In the retro uterine region, there was also a unilocular-solid formation with 59 mm x 61 mm x 57 mm, color score 3. None of the ovaries was equivocally identified. Due to these findings, CA125 levels were also determined with a result of 123.8 IU/ml. The patient was admitted and immediately started on intravenous (IV) antibiotic therapy (ceftriaxone 1g IV daily, metronidazole 500 mg iv twice daily, and doxycycline 100 mg IV twice daily). Clinical and laboratory improvement ensued and the patient was discharged at day nine with outpatient completion of antibiotic therapy (metronidazole 500 mg orally twice daily, and doxycycline 100 mg orally twice daily) for 14 days.

Two months later, at a follow-up gynecology appointment, the patient complained of persistent pelvic pain. Pelvic ultrasound revealed persistence of the left adnexal multilocular cystic formation, although CA125 level had decreased (85 IU/mL). Surgical treatment was proposed and an exploratory laparotomy was performed. At inspection a retro-uterine mass of approximately

10 cm long mass was found in close contact to the left ovary. Extensive adhesiolysis, total hysterectomy, and bilateral adnexectomy were performed with incidental rupture of the left adnexal formation with exteriorization of purulent material. The final histological analysis revealed a bilateral clear cell carcinoma of the ovary with involvement of the left fallopian tube, a borderline serous-mucinous tumor of the left ovary and bilateral ovarian endometriosis. Microbiology analysis of the aspirate was negative. The patient underwent surgical staging completion (pelvic and lumbo-aortic lymphadenectomy, omentectomy and parieto-colic gutters biopsies) with no evidence of residual disease and was staged FIGO IB and referred for follow-up at the Gynecological Oncology Unit. It has now been two years since the surgery with no evidence of disease recurrence. (Figure 1)

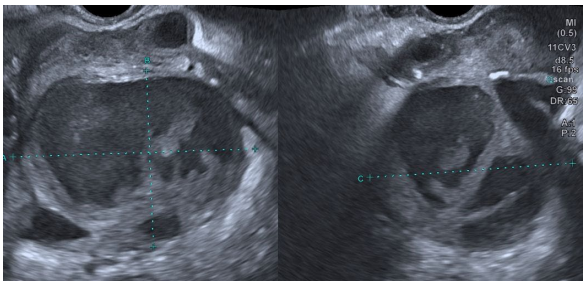

Figure 1. Case 1: Left adnexal multilocular-solid formation with "ground glass" content, interpreted as an infectious tubo-ovarian complex.

Case Report 2

A 50-year-old nulliparous woman (menopause at the age of 39, treated with menopausal hormone therapy for five years), with a history of right adnexectomy at forty years old due to PID, presented to general emergency department with acute pelvic pain and fever (38.5ºC) for a week. She had been on ciprofloxacin 500 mg orally twice daily and metronidazole 500 mg orally, twice day for 5 days. Laboratory tests showed increased inflammatory markers (WBCs 18,000 /µl with 77% of neutrophils; CRP 231 mg/L. An abdominal-pelvic computed tomography (CT) scan revealed a septate cystic lesion in the left adnexal region with 115 mm x 80 mm x 65 mm, irregular contours, thick wall, heterogeneous content, and some calcifications. Endopelvic fluid was also observed, suggesting cyst rupture or infection. A pelvic ultrasound revealed an anteverted uterus with reduced mobility and heterogeneous myometrium suggestive of diffuse fibromatosis. Notably, there was a left posterolateral FIGO 7 nodule (Figure 2) with 76 mm x 62 mm x 70 mm (initial differential diagnosis: myoma versus solid, regular, and sparsely vascularized adnexal mass with peripheral flows). In the right ovarian fossa, an irregular unilocular formation with 44 mm x 40 mm x 41 mm, "ground glass" content, color score 2, suggestive of infectious collection (Figure 3).

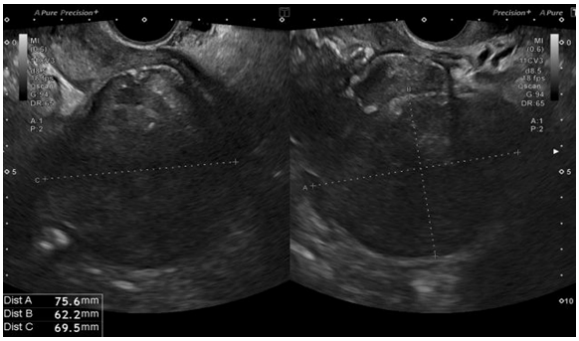

Figure 2. Case 2: Left posterolateral FIGO 7 myoma.

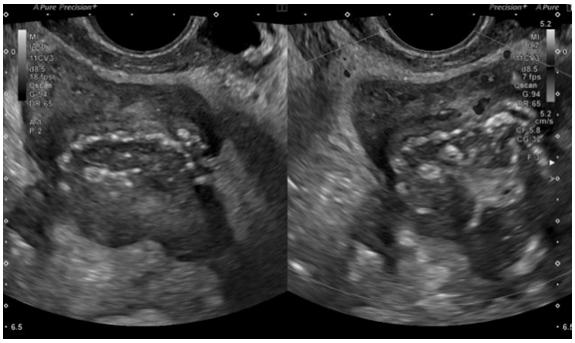

Figure 3. Case 2: Right adnexal unilocular and irregular formation with "ground glass" content, interpreted as an infectious collection.

The patient was admitted and initiated triple intravenous antibiotic therapy (ceftriaxone 1g IV daily, metronidazole 500 mg IV twice daily, and doxycycline 100 mg IV twice daily). Due to clinical and laboratory improvement, the patient was discharged at day six with outpatient completion of the antibiotic therapy (metronidazole 500 mg orally twice daily, and doxycycline 100 mg orally twice daily). However, she was readmitted two days later due to fever and worsening abdominal pain, along with increased leukocytosis (WBCs 14.000/µl) and CRP (116 mg/L).

Triple intravenous antibiotic therapy (ceftriaxone 1g IV daily, metronidazole 500 mg IV twice daily, and gentamicin 240 mg daily) was restarted, and surgical intervention planned. The patient underwent an exploratory laparotomy. A left tubo-ovarian mass was evidenced intra-operatively. A total hysterectomy with left tubo-ovarian mass excision was performed. Histological examination revealed endometrioid adenocarcinoma of the ovary (stage: FIGO IIB). Microbiological results were negative. The patient was referred to the Gynecological Oncology Unit. Without imaging signs of residual disease, she received six cycles of chemotherapy with carboplatin and paclitaxel. Currently, the patient is one year after surgery and seven months after the last cycle of chemotherapy with no evidence of disease recurrence.

Discussion:

The first case describes a 70-year-old nulliparous woman with a history of ovarian endometriosis, with clinical manifestations and ultrasound findings suggestive of PID after a hysteroscopic endometrial polypectomy. Due to resistance to antibiotic therapy, surgery was performed and definitive histological diagnoses were established: bilateral ovarian clear cell carcinoma, unilateral borderline serous-mucinous tumor and bilateral ovarian endometriosis. The second case describes a 50-year-old nulliparous woman with a history of right adnexectomy for PID, with clinical manifestations and ultrasound findings suggestive of PID. After failure of antibiotic therapy, surgical exploration revealed a lesion whose definitive diagnosis was ovarian endometrioid adenocarcinoma.

In both cases, the patients presented with the risk factors of PID as well as the clinical features and ultrasound findings compatible with PID (pelvic abscesses). However, after surgery, the histological diagnosis revealed ovarian malignant neoplasms. These two situations, that were witnessed over the past 2 years, prompted to evaluate our clinical practice and analyze the available literature on the clinical and ultrasound overlap between PID and adnexal malignancy.

A non-systematic but comprehensive literature search was conducted of the PUBMED database, as described above. Current literature does not establish PID as a definitive risk factor for ovarian cancer (6). Nevertheless, some studies have suggested a potential association (5, 7, 8, 9, 10). Although this relationship may not be causal, several studies do show that postmenopausal women with PID are at higher risk of associated malignancies (11, 12, 13). Identifying a tubo-ovarian abscess in a postmenopausal woman is less common and may obscure significant underlying health issues (14). Gynecological cancers that were found to be reported in association with PID include cervical squamous cell carcinoma, epithelial ovarian carcinoma and endometrial adenocarcinoma (11, 12, 13, 15).

The clinical characteristics and ultrasound findings of a tubo-ovarian complex or a tubo-ovarian abscess can closely mimic those seen in epithelial ovarian cancer, including mucinous, serous, clear cell and endometrioid subtypes. It has been documented that PID, when

complicated by the development of an abscess, may present sonographically as a unilocular or multilocular mass exhibiting a cogwheel appearance (in a component corresponding to the still visible sactosalpinx with incomplete septa) and mixed echogenicity (16). Abundantly vascularized solid component may be observed; thus, unilocular-solid or multilocular-solid presentation of a pelvic abscess can be seen. Borderline mucinous tumors of the ovary typically appear on ultrasound as unilateral, multilocular cystic masses with more than ten locules and no clearly defined solid components (16, 17). In contrast, invasive mucinous tumors often present with prominent solid areas (17). The most characteristic ultrasound feature of borderline serous ovarian tumors is the presence of papillary projections, distinguishing them from invasive serous tumors, which usually show fewer papillary structures but contain solid components (18). Clear cell carcinomas develop from endometriotic nodules in approximately 20-30% of cases with this diagnosis. Their most distinctive ultrasound features include solid multilocular or unilocular masses, often with low-level internal echoes or a ground-glass appearance. Additionally, solid nodules and papillary projections are seen in about 38% of cases, providing further diagnostic insight (19). Due to these similarities, concomitant pelvic malignancy should always be ruled out, in particular in postmenopausal PID resistant to intravenous antibiotic therapy. When ultrasound findings are inconclusive, magnetic resonance imaging (MRI) is a valuable modality for a comprehensive investigation of the differential diagnoses. However, even with a thorough pre- and intra-operative investigation, concomitant malignancy can be unrecognized (13). In these situations, the surgical threshold should be lower (20, 21). In cases of postmenopausal tubo-ovarian abscess that does not respond to medical therapy and requires a surgical intervention, we recommend involving at least one specialist in gynecological oncology as part of the surgical team. Additionally, considering intraoperative frozen section is strongly advisable.

Conclusion:

Prospective studies are needed to establish PID as a risk factor for ovarian cancer. PID is less frequent in postmenopausal than in premenopausal women, while the prevalence of ovarian cancer increases with age. If there is an inadequate response to conservative (antibiotic) therapy, in all patients and especially in postmenopausal women with persistent symptoms, a persistent adnexal mass or an adnexal lesion whose morphological complexity is increasing, it is crucial to exclude preoperatively accompanying neoplastic pathologies. Despite all efforts, distinguishing between these conditions can be very challenging due to significant clinical and imaging overlap.

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Hybrid Resolution of Abscessed Appendico- Cutaneous Fistula: Case Report

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Abstract

In this study the objective is to report a case of abscessed appendico-cutaneous fistula in a 52-year-old blind patient who presents a long-standing clinical picture, characterized by intense pain in the abdominal and inguinal region. Contrast-enhanced computed tomography of the abdomen reported a collection in the adipose tissue and muscle plane in the right iliac fossa and hypogastrium with a volume of 810 cm3, appendix in infra-cecal position with its tip projected inside the right inguinal canal in contact with the collection. The approach was initially percutaneous drainage to manage the abdominal wall abscess, then an exploratory laparoscopic approach, where the appendix was identified embedded in the abdominal wall towards the inguinal region, crossing it, with the tip located in the abscessed mass within the subcutaneous cellular tissue of the region. The patient was discharged on the eighth postoperative day due to a favorable evolution, returning to his activities after five weeks.

Study Objective: To present the clinical case, since it is a fairly rare pathology, in which the resolution was hybrid, between a conventional approach to drain the abscess and a laparoscopic approach for the resolution of the intra-abdominal appendicular part.

Key words: Appendicitis, Appendicular plastron, Laparoscopy, Abdominal wall abscess, Cutaneous fistula

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Introduction:

A fistula is an extra-anatomical communication between two or more epithelialized body cavities or with the skin surface (1). They can be classified according to their anatomical location, a fistula can originate in all segments of the urinary tract, digestive tract, genital tract, peritoneum and skin (2). The most frequent appendicular fistulas are those internal to hollow viscera, in order of frequency appendico-vesical, appendico-intestinal (ileum, cecum, duodenum, ascending colon and Meckel's diverticulum) and appendico-uterine, while appendico - cutaneous fistulas are extremely rare (3,4). In the literature, the first reported appendico-cutaneous fistula was found by Volz in the autopsy in 1846 (5). Subsequently, the reported cases of appendico-cutaneous fistula are few as it is an infrequent entity (6). When an untreated inflamed appendix progresses to suppuration, the usual course is rupture with abscess formation. In rare cases, acute appendicitis is resolved by fixation of the appendix to an adjacent viscus or to the parietal peritoneum and from there to the skin, which allows drainage of pus into the viscus or to the exterior. Cutaneous fistula can develop after drainage of an appendix abscess or secondary to an appendectomy (7). It can also develop spontaneously as a complication of acutely perforating appendicitis (8). The infectious process in the abdominal wall is a clinical picture that frequently occurs in surgical departments, it is of an extreme severity and with possible terrible consequences such as septic shock and multisystem organ failure (9).

Case Report

A 52-year-old blind man with a chronic clinical picture characterized by intense pain in the abdominal and inguinal region, for which he self-medicated with analgesics and anti-inflammatory drugs, as well as antibiotics (ATB). On physical examination: Abdomen: protruding erythematous mass of semi-hard consistency in the abdominal wall occupying the hypogastrium, iliac fossa, part of the flank and right inguinal region of approximately 15x10 cm with the presence of a crust with low-flow purulent fluctuation, decreased hydro-aerial sounds. Laboratory tests were performed: leukocytes: 17,000 x mm3, hematocrit: 37.7%, hemoglobin:12.4 g/dl. C-reactive protein: 131.2 mg/L and increased alkaline phosphatase 152 IU/L. Ultrasound reports a hypoechoic image with poorly defined irregular edges, extending upward to the right lumbar region, downward to the right inguinal and femoral region, presence of low intensity echoes compatible with collection. Computed axial tomography of the abdomen with contrast reports a collection in the adipose tissue and muscle plane in the right iliac fossa and hypogastrium with a volume of 810 cm3, appendix in infracecal position with tip projected inside the right inguinal canal in contact with the collection. (Fig. 1)

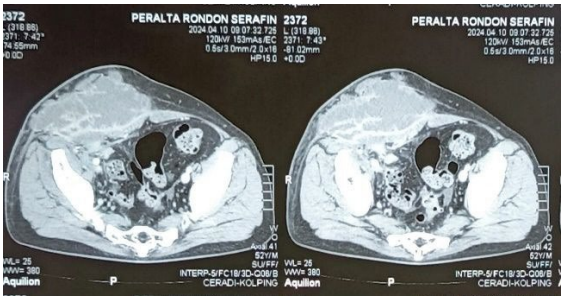

Figure 1: Contrast-enhanced computed tomography of the abdomen small intestine, terminal ileum and cecum firmly adherent to the lateral wall of the region.

Interventions

<u>Step 1 Conventional drainage of abscess time</u>

The patient was placed in a supine position and the surgery was performed under general anesthesia. Initially, percutaneous drainage was performed with several two cm incisions in the right iliac fossa and inguinal region on the same

sides, with a preference for areas with a major slope, to first manage the drainage of the abscess of soft tissue within the abdominal wall. A purulent discharge and an evacuation of devitalized tissues in of approximately 800 cc was observed. The region with the abscess was washed with Dakin-Carrel solution. After digital examination, an area in possible contact with the retroperitoneum and internal surface of the iliac bone was identified. Laparoscopic appendectomy procedure Step 1 Introduction of trocars in the second stage, an exploratory laparoscopy was started, placing the patient in a supine position and in Trendelenburg position with a 15° rotation to the left, with the arms at the sides of the body. Pneumoperitoneum was achieved using the trans umbilical technique and laparoscopic trocars were placed using the American technique as follows: one ten mm trocar in the navel for the 30° degree fore oblique laparoscope, two ten mm trocar under direct vision in the left iliac fossa, three five mm trocar in the midline two finger-widths above the pubic spine.

Step 2 Inspection of the abdominal cavity

In the right iliac fossa and lateral wall of the right flank, the plastron is observed, with loops of small intestine and caecum firmly adherent to the wall of the region (Fig 2).

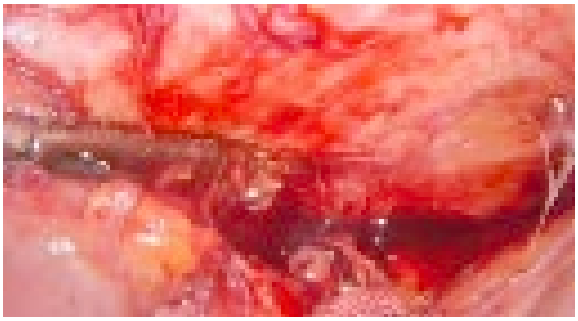

Figure 2: Cecum and terminal ileum adhered to abdominal wall with fibrous process suggestive of plastron

Step 3 Release of the plastron

A plastron is evident in the ileocecal region, formed by an intestinal loop. The cecum and terminal ileum are identified, attached to the abdominal wall with a fibrous process (Fig.3). The stump is then released using blunt and cutting maneuvers. A hole with purulent material is identified on the lateral wall of the inner face of the iliac bone, retroperitoneum at the level of the mid-axillary line, and a soft cecal appendix is also identified in the tract (Fig.4) and a sectioned appendicular base at the level of the cecal base.

Figure 3: Hole with purulent material exiting on lateral wall, also lysed cecal appendix in the tract

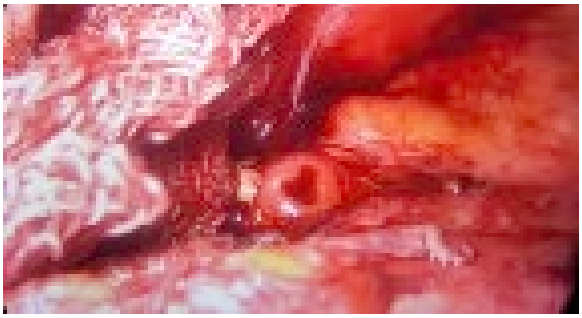

Fig. 4 Intact appendicular base sectioned in the caecum

Step 4 Enterorrhaphy of the appendicular stump

Enterorrhaphy in two planes: one plane with transfixion stitches with vicryl thread No. 3-0 and two planes with invaginating stitches with silk thread No. 3-0, revision of the appendicular base revealed no leak or hemorrhage, satisfactory hemostasis was obtained (Fig. 5)

Figure 5: Repair of appendicular base by enterorrhaphy in two planes.

Step 5 Fistula orifice

Curettage of a fistulous orifice of approximately two cm where the smoothed cecal appendix was located. A Penrose drain is left in the bloody space through the same path of the fistula leading to the superficial abdominal wall and exteriorized by an opening in the skin, placing a tubular drain in the rectovesical recess with external drainage towards the left iliac fossa.

Measurements and main results:

The percutaneous drainage lasted for 45 min and the exploratory laparoscopy for 130 min. The hydro procedure lasted for 175 minutes and the estimated blood loss was 150 ml. The patient followed a progressive hydro liquid diet for 12 hours after the procedure. The patient had an uncomplicated intraoperative and postoperative course, was treated with broad spectrum antibiotics (metronidazole and imipenem) and was discharged on the eighth postoperative day with laminar drainage, followed up with controlled dressings for 21 days with a noticeable improvement of the infection. The culture and antibiogram examination reported purulent fluid and gram-negative cocci. He was able to return to his daily activities 25 days after surgery. At her 5-week follow-up, she reported resolution of his symptoms.

Discussion:

Although appendico-vesical and appendico-intestinal fistulas are rare, an appendico-cutaneous fistula is even more uncommon and offers a diagnostic challenge as a cause of the fistula (4,5). According to Kjellman, the main mechanism of fistula formation is the spontaneous rupture of the inflamed appendix into the adjacent intestine or the skin and the persistence of the fistula is due to the presence of an appendicular stone or carcinoid tumor or tuberculosis (5). In our case, both causes were ruled out. Cutaneous openings have been reported in the lower right quadrant of the anterior abdominal wall and even in other locations such as the right gluteus (10). In this case, the fistulous tract was found from the abdominal cavity, through the lateral wall of the right iliac fossa, with an oblique tract externalized towards the anterolateral wall of the right iliac fossa with the presence of a subcutaneous abscess in it. In most of the reported cases, computed tomography (CT) has been used as the primary modality for definitive diagnosis. Abdominal CT helps not only to establish the diagnosis but also to assess the extent of involvement (7). In the present case, the CT reported that the appendix was located in the external inguinal orifice, however, during the surgery, it was shown that this was not the case. To determine the source of a fistula, the fistulogram is the ideal method. However, it was not possible to perform it in the present case (7). It is important to emphasize the fact that the cecal base was found sectioned, without the presence of abscess, fistula or greater involvement at this level, during the intraoperative period. This leads us to assume that there was a fistulous tract established from the abdominal cavity towards the subcutaneous cellular tissue of the abdominal wall of the right iliac fossa.

Conclusion:

In the reviewed literature, in many cases the laparotomy approach is the first choice, allowing the resolution of the condition, with the necessary technical and therapeutic possibilities, according to the intraoperative findings. The minimally invasive surgical approach offers the advantages of the technique, where the necessary procedures can also be performed according to what is identified during the surgery, thanks to the vast current technical possibilities offered by laparoscopic surgery, and/or hybrid procedures in trained hands, as in the present case. Laparoscopic surgery is a good therapeutic option, due to its high magnification, less surgical trauma, the feasibility of performing more complex procedures (example: complex Ileo-transverse resections with mechanical anastomoses, etc.), less postoperative pain for the patient and shorter hospital-stay. The best parameter for the resolution of this disease is definitely early diagnosis and once the patient's surgical situation has been established, no resources should be spared to achieve proper treatment according to the severity of the pathology found.

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A Modified Hysteroscopic suture fixation of LNG-IUS: a case report video article

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Abstract

LevoNorGestrel Intrauterine System (LNG- IUS) has a number of applications, both contraceptive and non-contraceptive benefits. Its non-contraceptive use has benefited several gynecological conditions such as adenomyosis, endometriosis, Abnormal Uterine Bleeding (AUB), chronic pelvic pain and as an adjunct to estrogen therapy for patients needing long term treatment and desirous of uterus and/or future fertility. However, the LNG IUS is associated with the problem of spontaneous expulsion especially in patients having a large uterine volume, or distorted uterine cavity. The aim of this video article is to demonstrate a modified hysteroscopic suture fixation of LNG IUS in a patient with history of Mirena expulsion. A case of a 42-year-old woman, completed her family but not consenting to Hysterectomy, with a history of previous LNG IUS expulsion is presented. The procedure was performed within 25 mins, with minimal blood loss (<10ml) and the patient was followed up for one month, having no complaints with significant improvement in symptoms and showing LNG-IUS in position with no downward displacement.

Our case report demonstrates the feasibility and effectiveness of a modification of LNG-IUS suture fixation under hysteroscopy. It provides additional benefits such as ease of application, lesser instruments and resources needed and no need for a second hysteroscopy at the time of removal/ change of LNG IUS.

Key words: Adenomyosis, Bulky Uterus, Hysteroscopy, LNG IUS, Operative Technique

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Introduction:

The LNG IUS is extensively utilized for both contraception and the therapeutic management of various gynecological conditions. It has demonstrated effectiveness in treating heavy menstrual bleeding, endometriosis, adenomyosis, and serves as an adjunct for endometrial protection in women undergoing estrogen therapy (1-4). The localized hormone release mechanism of the LNG IUS results in a lower systemic hormonal load, making it a favourable alternative to oral contraceptives, systemic hormonal treatments, and hysterectomy (5). However, spontaneous expulsion of the LNG IUS can occur, particularly in patients with uterine abnormalities, multiparity or heavy uterine bleeding (6-8). Expulsion reduces therapeutic efficacy and may lead to discomfort, unintended pregnancy, and increased costs due to re-insertion procedures (9). Ensuring optimal placement and stability of the device within the uterus is crucial for sustained effectiveness (10).

Various fixation techniques have been explored to address this issue, each presenting its own complexities (11). In this case report, a modified hysteroscopic suture fixation technique to secure the LNG IUS in patients prone to expulsion is described. This approach aims to provide a minimally invasive, cost-effective, and efficient solution.

Patient and technique:

A 42-year-old woman came with the complaints of severe dysmenorrhea and heavy menstrual bleeding, suspicion of adenomyosis. Ultrasound revealed a bulky uterus (9cm x 5cm x 4cm) with adenomyosis, the volume estimated ad ~180ml. She had two vaginal deliveries previously; her family completed and had undergone tubectomy. She was complaining of having heavy menstrual bleeding since many cycles and was chronically anaemic. However, the patient was not willing to have her uterus removed and wanted a long-term treatment with preservation of the uterus. She had a LNG IUS inserted once but at spontaneous expulsion occurred four months after insertion and the symptoms persisted. Hysteroscopic suture fixation of LNG IUS was discussed with the patient. The patient was informed about procedure. The procedure was performed under short general anesthesia. The cervix was dilated up to ten cm and the uterine cavity seen. The length of the cavity was around nine cm and endometrium was found to be thickened. The size of the hysteroscope used was 25Fr and instruments of the size 4mm in diameter were used with normal saline as distension media.

Using 5mm laparoscopic needle holder (passed into the cavity, parallel to the hysteroscope) and Ethibond 1 suture, a deep needle bite was taken in the posterior uterine wall. The vertical stem of LNG IUS was tied to the suture near the middle of one end and pulling onto the other end, the LNG IUS was positioned below the fundus and confirmed hysteroscopically. Both ends of the suture material were tied taut to the ING IUS thread just above the internal os and cut. Patient tolerated the procedure well.

Result:

The procedure was performed within 25 mins, with minimal blood loss (< 10 ml) and the patient was followed up for one month, having no complaints with significant improvement in symptoms and showing LNG-IUS in position with no downward displacement.

Discussion:

The levonorgestrel intrauterine system (LNG IUS) is widely recognized for its non-contraceptive

benefits in managing various gynecological conditions, including adenomyosis and endometrial hyperplasia. These conditions often result in abnormal uterine bleeding, pelvic pain, subfertility and diminished quality of life. For women seeking fertility preservation or uterine-sparing treatments, the LNG IUS offers an effective long-term solution by significantly reducing uterine size, heavy menstrual bleeding, and dysmenorrhea. However, a notable challenge with LNG IUS usage is the risk of spontaneous expulsion, especially in patients with an enlarged uterine volume (greater than 150 ml). Studies have reported overall expulsion rates of approximately 9.6%, with higher rates observed in women with adenomyosis and myomas, ranging from 9.1% to 15.8% (12). One strategy to mitigate this issue involves pre-treatment with gonadotropin-releasing hormone (GnRH) agonists to reduce uterine size, thereby decreasing expulsion rates. However, long-term use of GnRH agonists is associated with adverse effects such as bone loss and menopausal symptoms, and may not be cost-effective.

Fixation of the LNG IUS presents a viable alternative, offering fewer side effects and reduced costs for women at high risk of expulsion who wish to preserve their uterus. Several studies have explored LNG IUS fixation techniques, including hystero-laparoscopic fixation and hysteroscopic suture fixation, with the choice of method depending on surgical expertise, available resources, and patient-specific factors. These techniques have demonstrated a significant reduction in expulsion rates.

In this context, we present a modified hysteroscopic suture fixation technique, building upon the method described by HaiHong Cui et al. (13). Our approach offers several advantages:

● Ease of Application: Traditional suture placement during hysteroscopy can be challenging due to the presence of fluid within the uterine cavity and limited space. Our modification simplifies the procedure, requiring a shorter learning curve and less extensive surgical training.

● Elimination of Additional Instruments: This technique does not necessitate the use of extra-corporeal knot-pushing devices, streamlining the procedure and reducing equipment needs.

● Eliminating the need for a second hysteroscopy at the time of removal of device.

These benefits position our modified technique as a practical and effective solution to the problem of LNG IUS expulsion, enhancing patient outcomes and procedural efficiency.

Conclusion:

Our case report demonstrates the feasibility and effectiveness of a modification of LNG-IUS suture fixation under hysteroscopy. As compared to the procedure done previously, it provides additional benefits such as ease of application, lesser instruments and resources and no need for a second hysteroscopy at the time of removal/ change of LNG IUS. This method can have wider use due to shorter learning curve and better patient acceptability.

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Laparoscopic Reverse Technique in Excision Surgery for Deep Endometriosis: Natural Orifice Specimen Extraction Surgery (NOSES) (Video Article)

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Abstract

This video article presents a surgical technique and clinical case video demonstrating the "Reverse Technique" in laparoscopic surgery for deep endometriosis excision, combined with the "Natural Orifice Specimen Extraction Surgery" (NOSES) technique for intestinal resection. We demonstrate both techniques through the case of a 25-year-old patient with a BMI of 20, nulligravida, diagnosed with deep infiltrating endometriosis involving the bowel. The patient presented with severe dysmenorrhea, dyschezia, hematochezia, and bowel inflammation, with MRI findings indicating intestinal involvement. The application of the above methods reduced the operating time to 150 minutes, with an EBL of 50cc, compared to an average of four hours and higher blood loss for similar segmental intestinal resections (1). The surgery was completed without complications, and the patient had an optimal recovery, being discharged 48 hours post-surgery.

Learning objective of the Case Report:

This video article aims to demonstrate the effectiveness of combining the Reverse Technique with NOSES in the laparoscopic treatment of DIE with bowel involvement. This innovative approach optimizes surgical time, reduces complications, and enhances precision in the treatment of deep infiltrating endometriosis with intestinal involvement. This video article presents a case of a 25-year-old patient with DIE involving the bowel, accompanied by symptoms such as dysmenorrhea, dyschezia, and hematochezia. Through this case, we demonstrate the application of the NOSES technique combined with the Reverse Technique, which effectively reduces OT and enhances surgical outcomes.

As advanced pelvic laparoscopic and endometriosis surgeons, it is important for us to introduce innovative techniques that not only demonstrate resection surgeries for DIE but also provide fertility-preserving approaches for patients with complex cases involving rectal involvement. We believe this submission is highly relevant due to its innovative approach and potential to improve surgical outcomes in complex endometriosis cases, significantly contributing to the field of gynecological surgery.

Key words: Natural Orifice Specimen Extraction Surgery (NOSES), Deep infiltrating endometriosis (DIE), Infundibulo-pelvic Ligament (IP Ligament), Magnetic Resonance Imaging (MRI), Estimated Blood Loss (EBL), Operative Time (OT).

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Introduction:

DIE is characterized by the presence of endometrial- like tissue infiltrating beyond the superficial peritoneum. This condition can cause significant anatomical changes, invading critical structures such as the bowel, ureters, and nerves, leading to severe pain and functional impairment. Surgical procedures in such cases carry a high risk of complications, with rates as high as 10-22% when intestinal resection is required. For this reason, these surgeries should be performed by highly trained surgeons with extensive knowledge of pelvic anatomy. Two main surgical techniques are described for this type of surgery: the Reverse Technique and the classical laparoscopic approach, which have distinct methodologies. Unlike the traditional technique, which involves identifying and removing the diseased areas first, the Reverse Technique begins with the separation of the healthy from the affected tissues, moving toward the diseased regions (2,3). The final step in Reverse Technique involves dissection of the affected tissues and rectal nodules, allowing the surgeon to establish clean surgical planes (4). Traditional laparoscopic approaches for intestinal involvement can be time- consuming and prone to complications. The combination of NOSES and the Reverse Laparoscopic Technique provides a novel and more effective approach to improving outcomes in complex endometriosis cases.

Patient and Methods:

We present a case of a 25-year-old patient with severe endometriotic symptoms, including severe dysmenorrhea, dyschezia, and hematochezia, and abdominal pain that clearly intensified with menstrual cycle. Mandatory pre-surgical endometriosis mapping was realized, and the pelvic MRI findings revealed a 38mm nodular plaque involving the uterine torus and extending towards the rectum, compromising 40% of its lumen, located 10cm from the recto anal junction.

Main Outcomes:

OT, compared to traditional methods. Postoperative pain and recovery time.

Preservation of critical anatomical structures. Cosmetic outcome.

Results:

Surgery lasted 150 minutes. The patient was monitored during hospitalization with procalcitonin and C-reactive protein levels, as a parameter of colorectal anastomosis dehiscence, which remained normal. She was discharged from the hospital with adequate tolerance to a general anti-inflammatory diet after the second day of hospitalization, with no further complications. The patient showed significant improvement of symptoms one month after surgery. Pathology report revealed colonic mucosa with chronic inflammation and edema, associated with a fibromuscular tissue nodule with extensive endometriosis, measuring a total of five centimeters.

Discussion:

The NOSES technique provides significant advantages by using the anus as a natural entry point, eliminating the need for large abdominal incisions (5,6). This minimizes unnecessary tissue manipulation, accelerates the surgery, and reduces the need for patient repositioning during the procedure (6). The absence of extensive external incisions decreases the risk of complications such as infections and hernias, while also offering a cosmetic benefit, as no visible scars are left. Patients typically experience less postoperative pain, leading to faster recovery and an earlier return to normal activities. In the Reverse Technique, used in laparoscopic surgery for endometriosis, healthy tissue is lateralized while the diseased tissue is medialized. This method helps separate key structures, such as the hypogastric nerves and ureters, from the central area affected by the disease (7,8). The reverse approach consists in performing the dissection of the pelvic anatomy in a reverse order as compared to traditional methods. By starting the dissection in less affected areas, the surgeon gains better visibility and access to deeper regions, reducing the risk of injury to vital structures. In contrast, starting from the more severely affected areas in standard techniques can lead to accidental damage due to poor visibility or complex anatomical distortions. Both techniques present a significant advancement in the management of complex deep infiltrating endometriosis with bowel involvement. OT was reduced to 2 hours and 30 minutes, compared to the typical 4 hours for standard segmental intestinal resection procedures (8-10).

Conclusions:

The combination of NOSES and the Reverse Technique significantly improves surgical efficiency and patient outcomes in cases of deep infiltrating endometriosis with bowel involvement. This approach reduces operative time, enhances the safety of the procedure, minimizes postoperative complications, and improves cosmetic outcomes. Further studies are recommended to explore the broader applicability of this technique in other complex surgical cases.

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