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Challenges in Laparoscopic Total Hysterectomy and Left Salpingo-oophorectomy For Persistent Endometrial Atypical Hyperplasia: Incidental Bilateral Double Ureters – A Case Report

*Mohamed Hemdan, Mohamed Elsherbiny, Hassan Idris

***Corresponding author**: Mohamed Hemdan, Gynaecology Department, St Mary Hospital, Manchester Foundation NHS Trust, The United Kingdom

E-mail: m.hemdan88@gmail.com

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Abstract
Laparoscopic total hysterectomy and salpingo-oophorectomy are commonly performed procedures for the management of endometrial atypical hyperplasia, a precancerous condition of the uterine lining. However, the surgery can be complicated by unexpected anatomical variations, such as the incidental discovery of bilateral double ureters. This case report highlights the challenges and management strategies associated with this rare finding. The incidental finding of bilateral double ureters during the procedure presents a significant surgical challenge. This case report highlights the importance of intraoperative vigilance, precise surgical technique, and the ability to adapt to unexpected anatomical variations to ensure patient safety and successful outcomes. Further awareness and reporting of such cases are essential to refine surgical approaches and improve patient outcomes in the presence of such anomalies. Despite the complexity introduced by the double ureters and pelvic adhesions, the procedure was successfully performed without compromising ureteral integrity.
Key words: Endometrial Atypical Hyperplasia, Bilateral Double Ureters, Laparoscopic Total Hysterectomy, Left Salpingo-oophorectomy, case report.

Introduction

Atypical endometrial hyperplasia (AEH) is considered a precancerous disease. However, 27%–52% of patients with preoperative AEH were reportedly diagnosed with endometrial cancer (EC) after hysterectomy **[1].** Total laparoscopic hysterectomy (TLH) is being widely used to treat AEH, but no consensus exists on the preoperative evaluation, surgical procedure, and laparoscopic techniques for AEH **[2].**

A double ureter is a congenital anomaly of the urinary tract that can lead to various clinical problems, including vesicoureteric reflux, urinary tract infections, ureterocele, ectopic ureter, and ureteric obstruction **[3].** Duplex ureter is estimated to occur in one in 500 people, and reported cases of injury during hysterectomy are rare **[4].**

Ureteral injuries are well-known complications of gynecologic surgery, with a higher prevalence in laparoscopic surgery than in laparotomy. Ureter injury is a complication that must be avoided in total hysterectomy. It has been reported that laparoscopic surgery has a higher frequency of ureter injury than open surgery in total hysterectomy (laparoscopy: 0.13% and open surgery: 0.04%) **[5].**

Definition of atypical endometrial hyperplasia:

An aberrant growth of cells within the endometrial lining, the inner layer of the uterus, characterizes Atypical Endometrial Hyperplasia (AEH). Atypical cell proliferation occurs when endometrial cells not only proliferate abnormally but also display structural abnormalities that set them apart from normal cells. The fact that AEH is a precancerous condition increases the likelihood that endometrial cancer, and more especially endometrioid adenocarcinoma, the most prevalent kind of uterine cancer, would develop makes it a major health issue.

Hormonal fluctuations, especially those involving estrogen and progesterone, cause the endometrium to naturally go through cyclic alterations during a woman's menstrual cycle. In the initial part of a woman's menstrual cycle, estrogen promotes endometrial lining growth and thickening in anticipation of a possible pregnancy. The endometrial lining is lost during menstruation and progesterone levels diminish if pregnancy does not occur. Endometrial hyperplasia occurs when the estrogen and progesterone levels are out of whack, most dramatically when estrogen levels stay high without progesterone's balancing influence. Atypical endometrial hyperplasia occurs when the hyperplastic tissue cells start to exhibit abnormal structural changes[6].

Although atypical hyperplasia can manifest in any age group of women, it is more often seen in those who are menopausal or nearing menopause due to the increased frequency of hormonal abnormalities at this time. The use of estrogen-only HRT without the counterbalance of progesterone, obesity, polycystic ovarian syndrome (PCOS), diabetes, and other established risk factors all raise the likelihood of developing AEH. Particularly important is obesity because excess estrogen levels, caused by the production of estrogen by adipose tissue (body fat), can promote endometrial development.

A mix of clinical evaluation, imaging, and histological analysis is usually used to diagnose AEH. In order to definitively diagnose endometrial cancer, a biopsy is performed. This involves taking a small piece of tissue and analyzing it under a microscope to look for abnormal cells. It is also possible to measure the endometrial lining thickness with imaging techniques like transvaginal ultrasonography. Abnormal uterine bleeding, menstrual bleeding (especially heavy or irregular periods), or bleeding after menopause are symptoms that women with AEH may experience. But other AEH cases don't show any symptoms at all, and doctors may find out about it by chance when they check for other health problems[7]

Factors leading to the development of this condition and the risk of it turning into endometrial cancer:

Age, future fertility goals, and the extent of the abnormalities all play a role in determining the best course of treatment for AEH. Hormonal therapies, such progestin therapy, can counteract estrogen's effects and reverse hyperplastic alterations in younger women who want to keep their fertility. A hysterectomy, the surgical removal of the uterus, may be suggested to postmenopausal women or those who do not want to continue having children as a means of preventing cancer. Additional medical or surgical procedures may be required in cases where cancer has already been suspected.

Early detection and proper treatment are of the utmost importance in AEH due to the possibility that it may develop into endometrial cancer. In order to recognize and treat any changes in AEH quickly, it is necessary that women diagnosed with the condition undergo regular monitoring and follow-up appointments with their healthcare professional [8]

There is an increased likelihood of endometrial cancer, and more specifically endometrioid adenocarcinoma, the most prevalent form of uterine cancer, in patients with atypical endometrial hyperplasia (AEH). The majority of the causes of AEH are hormonal abnormalities, particularly the lack of progesterone leading to estrogen's unopposed action. An overgrowth of the endometrial lining, which increases the likelihood of abnormal cell alterations and, eventually, cancer, results from this hormonal imbalance. If we want to stop AEH from becoming cancer, we need to know what causes it [9]

Causes of Adverse Estrogen Hormone (AEH) Syndrome:

– Prolonged estrogen exposure without the balancing action of progesterone is the main cause of atypical endometrial hyperplasia. While estrogen causes the endometrial lining to thicken and expand, progesterone stabilizes and sheds it during menstruation, thereby reversing the action of estrogen. Hyperplasia can occur when progesterone levels are low and estrogen is continuously stimulated. Irregular ovulation cycles, as those seen in polycystic ovarian syndrome (PCOS), or women approaching menopause are more likely to experience this imbalance.

-The increased estrogen synthesis by adipose (fat) tissue in obese people makes obesity a strong risk factor for AEH. After menopause, when estrogen synthesis in the ovaries decreases, the majority of a woman's estrogen originates from her body fat. The endometrial lining becomes overstimulated due to an overabundance of estrogen, which raises the likelihood of hyperplasia and abnormal cellular alterations. Insulin resistance, which is more common in obese women, is associated with an elevated risk of endometrial cancer [10].

-The irregular ovulation that characterizes polycystic ovary syndrome (PCOS) causes estrogen to remain unopposed for extended periods of time. Inadequate progesterone production results in persistent endometrial stimulation in women who do not ovulate regularly. Consequently, the likelihood of AEH and its subsequent progression to cancer is increased in these women.

-Hormone Replacement Therapy (HRT) Concentrations: A greater incidence of AEH is observed in postmenopausal women who undergo estrogen-only HRT without concurrent progesterone administration. Hyperplasia can develop when estrogen stimulates aberrant growth in the endometrium, despite estrogen's beneficial effects on menopausal symptoms. Hence, to reduce this risk, it is advised to undergo combined estrogen-progesterone therapy.

- Hormonal changes during menopause cause oscillations in estrogen and progesterone levels, making AEH more frequent in women nearing or past menopause. Due to the elevated risk of endometrial cancer and abnormal endometrial hemorrhage (AEH), any spotting or bleeding in postmenopausal women should prompt evaluation [11].

Endometrial Cancer Progression Risk :

uterine cancer progression is greatly accelerated in the presence of abnormal uterine lining alterations. Untreated atypical hyperplasia increases the risk of endometrial cancer in women by 25-30%, according to studies. When a woman reaches menopause, her body stops making progesterone, which means estrogen can act unopposed, increasing the chance of advancement.

Adverse cell events (AEH) occur when aberrant cells exhibit atypia, a change in cell size, shape, and organization that precedes malignancy. Without treatment, these abnormal cells can develop into invasive cancer cells that invade deeper layers of the uterus and beyond the endometrium.

Management and Prevention

Early detection and proper therapy of AEH are the best defenses against cancer progression. Treatment with hormones, and especially progestin, can often turn hyperplasia around. A hysterectomy may be suggested as a means of preventing cancer in women who are at a higher risk, such as those who have experienced menopause or who have significant atypia. To effectively manage AEH and lower the risk of cancer development, regular monitoring is essential, including imaging and follow-up biopsies [12].

Conditions such as atypical endometrial hyperplasia (AEH) and specific stages of endometrial cancer are typically treated with laparoscopic surgery or a complete hysterectomy. These techniques effectively remove the diseased tissue with little invasiveness, minimizing the risk of disease development.

Laparoscopic surgery is a minimally invasive procedure that entails creating small incisions in the abdomen. A thin tube equipped with a camera and surgical equipment are then placed into these incisions. Surgeons can access the uterus and other pelvic organs with this method, minimizing damage to the surrounding tissues. Laparoscopic surgery has many advantages over traditional open surgery, including less scarring, less pain after the procedure, and faster recovery. To diagnose AEH, a total hysterectomy or biopsy is typically performed using laparoscopic surgery.

In a total hysterectomy, not only is the uterus surgically removed, but the cervix, ovaries, and fallopian tubes are also removed. This operation is the gold standard for treating AEH, particularly in postmenopausal women or those at high risk of endometrial cancer. The likelihood of cancer developing is eradicated by uterine removal. There are two main methods for removing a woman's uterus: open abdominal surgery and the less invasive, less invasive, and more recent alternatives, such as laparoscopic or robotic-assisted surgery, which are both becoming more popular.

A combination of laparoscopic surgery and total hysterectomy is an excellent therapy option for women with advanced endometrial hyperplasia (AEH) or early-stage endometrial cancer. This approach offers therapeutic benefits while decreasing the chances of disease recurrence or progression [13].

Left salpingo-oophorectomy:

- **Indications for salpingo-oophorectomy.**

During a salpingo-oophorectomy, the fallopian tubes (salpingectomy) and ovaries (oophorectomy) are surgically removed. Many medical conditions can be treated with this surgery, and it is also done to protect women at high risk of cancer from developing the disease. A person's health, their risk factors, and the advantages and disadvantages of having these reproductive organs removed all play a role in the choice to have a salpingo-oophorectomy[14]

A Salpingo-oophorectomy May Be Necessary
Breast Cancer: Ovarian cancer is among the most prevalent and serious causes requiring a salpingo-oophorectomy. This cancer typically does not cause any symptoms in its early stages, hence it is often detected at a late stage when it has spread to the ovaries. For women with a history of ovarian cancer or at high risk for developing the disease, removing the ovaries and fallopian tubes is an option for treatment or prevention.

Reducing chance for High-Risk Patients: The lifetime chance of getting ovarian and breast cancer is higher for women who have genetic abnormalities like BRCA1 or BRCA2. In order to greatly decrease the likelihood of cancer in these women, a preventative salpingo-oophorectomy may be suggested. In high-risk women, ovarian and fallopian tube removal can reduce the incidence of ovarian cancer by 80-90%, according to studies. This preventative step is usually recommended once a woman has finished having children or after menopause, though it really depends on her age and family history.

If the endometrial cancer has advanced or if there is worry that the cancer may spread to the ovaries or fallopian tubes, a salpingo-oophorectomy may be performed in conjunction with a hysterectomy (uterus removal) to treat the disease. Endometrial cancer patients who have gone through menopause, or who have very aggressive or advanced cases, may be advised to have this surgery [15]

Although benign ovarian tumors and cysts are not as dangerous as cancer, a salpingo-oophorectomy may be necessary in certain cases. The removal of the afflicted ovary and fallopian tube is occasionally an option for treating large cysts or tumors that produce pain, bleeding, or other symptoms. It may be advised to remove the ovaries to remove any future risk of cancer if a benign tumor looks suspicious or could develop into one.

An infection or abscess can develop in the fallopian tubes or ovaries as a result of chronic pelvic inflammatory disease (PID). To remove the diseased organs and stop additional problems, a salpingo-oophorectomy might be required in such a circumstance. If the infection keeps coming back or doesn't respond to antibiotics, this becomes even more crucial.

When an egg that has fertilized implants itself somewhere other than the uterus, most commonly in a fallopian tube, the result is a condition known as an ectopic pregnancy. A potentially fatal internal hemorrhage can result from a ruptured tube if the pregnancy is not addressed quickly enough. When this happens, the patient may need an emergency salpingo-oophorectomy to remove the affected fallopian tube and stop the bleeding.

Extreme Endometriosis: Endometriosis is a disorder that impacts the uterine lining and can spread to the ovaries and fallopian tubes. A salpingo-oophorectomy is a potential therapeutic option for severe or advanced endometriosis that brings about persistent discomfort, infertility, or substantial damage to the reproductive organs. It helps alleviate symptoms and prevents the illness from returning.

When the ovary bends around its supporting ligaments, cutting off its blood supply, this condition is known as ovarian torsion. An immediate surgical procedure is necessary to resolve this medical emergency. If the ovary has been badly harmed by the lack of blood supply, a salpingo-oophorectomy can be done to remove the afflicted ovary and stop the issues from getting worse[16]

- **Factors affecting surgical decision making.**

Clinical, personal, and logistical issues are the three main categories into which the choice to proceed with surgical intervention falls. A well-informed decision that is specific to each patient's needs and situation can be achieved by keeping these considerations in mind.

Medical Considerations

1. The Prognosis and Level of Illness: The severity and accuracy of the diagnosis are the main clinical considerations in deciding whether or not to undergo surgery. For example, when it comes to cancers like ovarian or endometrial, the decision is heavily influenced by the stage and grade of the disease. Less intrusive methods may be able to control tumors in their early stages, but more substantial surgery may be necessary for cancers in their later stages. In a similar vein, surgical intervention may be necessary for benign disorders such as big ovarian cysts or persistent pelvic inflammatory disease if conservative therapy fail.

2. Disease advancement Risk: Prophylactic or therapeutic surgery may be suggested in cases where there is a high risk of cancer advancement, such as with atypical endometrial hyperplasia or genetic predispositions such BRCA mutations. In order to prevent additional complications or cancer from developing, the benefits of removing the damaged organs are considered in relation to the dangers and probable progression of the condition.

3. Patient Health Status: When deciding on a surgical procedure, it is essential to consider the patient's overall health, including any preexisting diseases or illnesses. The hazards of anesthesia and surgery are thoroughly evaluated for patients with serious medical conditions like diabetes or heart disease. If the patient's health condition could cause serious complications before or after surgery, it may be necessary to prescribe preoperative optimization or alternative treatments [17].

An individual's circumstances

1. Patient Values and Preferences: The independence of the patient is paramount while making surgical decisions. Surgery type, desired results, and impact on quality of life are all factors that must be considered. For instance, in order to avoid irreversible damage to their fertility, some patients may choose for less drastic therapy or postpone surgery. Some people may be willing to put off less intrusive operations in order to get rid of sickness.

2. Future goals and Lifestyle: It is also crucial to think about how surgery will affect the patient's future goals and lifestyle. The risk of infertility is a consideration for women considering surgery whether they are still in their reproductive years or who are trying to create a family. On the other hand, the long-term advantages of surgical intervention in halting disease development may be more important to postmenopausal women or those who have finished their family planning.

The third aspect to think about is the psychological impact of surgery. This includes things like the possibility of alterations to one's body image and emotional discomfort. When patients are faced with substantial life changes, including the loss of reproductive organs, counseling or support may be a component of the decision-making process to help them cope emotionally with the impending surgery [18].

Element of Logistics

1. Surgical Risks and Benefits: It is essential to have a comprehensive discussion with the patient regarding the risks and benefits of each surgical option. Infection, hemorrhage, or negative reactions to anesthesia are examples of potential risks. A better quality of life, reduced symptoms, and disease control are the metrics used to evaluate benefits. When patients are given all of the information they need, they are better able to decide if the benefits are worth the dangers.

2. Surgical Expertise Availability: The decision-making process can be impacted by the presence of qualified surgical teams and suitable facilities. It is crucial to have access to top-notch surgical care, since some treatments may necessitate specialized knowledge or tools. The final result and the length of time it takes to recuperate can be affected by the surgical facility or hospital that is chosen.

The third factor to consider is the cost and insurance coverage of the surgery. This includes not only the actual cost of the procedure, but also the amount that the patient will have to pay out of pocket. Patients should think about how much their insurance will cover the treatment and how much it will cost. This is important because insurance can limit patients' options for surgery and subsequent care[19].

Double ureters:

A bilateral duplex kidney, also known as a double ureter, is an extremely unusual birth defect in which there is an extra ureter on either side of the kidney. Often found by chance during imaging exams for unrelated conditions, this disease can manifest on either one side or both sides. Examining the origins, consequences, and administration of this oddity is necessary for comprehending it.

Growth and Structure

First, during embryonic development, the ureters branch out from the mesonephric ducts, which are part of the mesodermal tissues that make up the urinary system. It is common for there to be just one ureter connecting the kidneys to the bladder.

The ureteric bud, which normally gives rise to both ureters, might divide or multiply into two distinct ducts in instances of a double ureter, an anomaly in development. Because of this, the ureters that carry urine out of the kidneys and into the bladder are separate for each kidney.

The appearance of ureteral duplication might vary due to anatomical variations. The two ureters that originate in the same kidney might join forces before reaching the bladder in certain instances, but in others, they might go their own ways. It is not uncommon for the two ureters to have distinct patterns of drainage; for example, one ureter may empty into the upper kidney and the other into the lower kidney. Because of this diversity, clinical manifestations and consequences can vary[20].

Research Consequences
One difference between symptomatic and asymptomatic presentation is that many people with a double ureter do not experience any symptoms at all and the abnormality is often found by chance during imaging tests for unrelated problems. Recurrent UTIs, urinary blockage, or hydronephrosis (kidney swelling from urine accumulation) are some symptoms that may occur in individuals with a double ureter. Reasons for this include possible abnormalities or obstructions in the duplicated ureters.

2. Enhanced Propensity for Complications: Individuals that possess both sets of kidneys in their bodies may be more prone to specific issues, such as ureteral reflux (the reverse flow of urine from the bladder to the kidneys), a heightened vulnerability to urinary tract infections (UTIs), and the possibility of ureteral blockage or stones. Failure to adequately handle these issues can result in long-term renal damage.

Imaging investigations: Ultrasound, intravenous pyelograms (IVPs), or computed tomography (CT) scans are common imaging investigations used to diagnose a double ureter. By detecting the presence of two ureters, these tests aid in the evaluation of any related problems, such as reflux or obstruction.

2. Further Testing: Further testing, like a renal scan or cystoscopy, may be conducted to assess the health and function of the kidneys and ureters in instances when symptoms or concerns regarding kidney function are present[21].

Care and Healing:
Conservative Management: In circumstances where symptoms are not present, it may not be necessary to administer treatment. Instead, patients are often closely monitored for any possible consequences. To prevent major complications down the road, it may be recommended to have imaging and follow-up appointments often.

2. Surgical Procedure: If you experience any problems or symptoms like blockage, recurring infections, or severe reflux, it may be required to undergo surgical intervention. Procedures to reimplant the ureter(s) into the bladder, fix the obstruction, or address any related abnormalities may be available as surgical options.

3. Ongoing Monitoring: Patients with a double ureter may still need ongoing monitoring to handle any issues that may arise and make sure their kidneys are working as they should. This may necessitate imaging investigations, frequent checkups, and possibly antibiotic prophylaxis to forestall infections [22].

Considerations for a Successful Laparoscopic Hysterectomy

-Advantages

First and foremost, laparoscopic hysterectomy has the advantage of being very minimally invasive. Laparoscopic hysterectomy uses a series of tiny incisions rather than the massive incisions used in traditional open surgery. With less physical harm to the body, patients may have less postoperative discomfort and a quicker recovery with this minimally invasive technique. In comparison to open surgical procedures, patients typically see less scars and recover faster.

Laparoscopic surgery typically results in reduced postoperative pain for patients because smaller incisions are utilized. Patients may feel more comfortable during their recovery time and may use less pain medication as a consequence of this improvement in pain management.

Thirdly, Laparoscopic hysterectomy usually means less time in the hospital and faster recovery than the old-fashioned open hysterectomy. Those with hectic schedules or demanding jobs may appreciate the fact that patients are typically able to resume their regular activities more quickly. Generally speaking, there is far less downtime overall, which can make recuperation easier.

4. Laparoscopic hysterectomy improves cosmetic outcomes by minimizing scar appearance through the use of tiny incisions. Scars can have a negative effect on a person's self-esteem and body image, so this is a major cosmetic factor for many patients.

5. Improved imaging: Surgeons can see and operate with more precision using the laparoscope, which enables high-definition imaging of the pelvic organs. The precision of the procedure and the safety of the surrounding tissues can both be improved with this improved vision[23].

-Problems to Address

1. Compared to open hysterectomy, laparoscopic hysterectomy is more technically challenging. The surgeon must possess specific training and exceptional ability for this procedure. Using laparoscopic devices and being very exact in the small abdominal region can be challenging, especially for surgeons without much experience.

Second, there is the possibility that a laparoscopic hysterectomy will take more time to complete than an open one. The complexity of the case, the surgeon's level of competence, and the patient's anatomy can all impact the time necessary. The efficiency of the surgery and the likelihood of complications are both compromised by prolonged operating durations.

3. Conversion to Open Surgery: Despite the benefits, there is a chance that a laparoscopic hysterectomy could end up requiring an open procedure conversion in the event of complications or unforeseen challenges encountered by the surgeon. Because of this change, the recovery period may be lengthened and the advantages of the minimally invasive method may be diminished[24].

4. Complication Risk: Although there are less risks associated with laparoscopic hysterectomy compared to open surgery, problems can still occur. Problems with anesthetic, infection, hemorrhage, or damage to nearby organs are all possible outcomes. The patient's general health, the existence of any prior ailments, and the intricacy of the surgical operation can all impact the likelihood of complications.

The narrow working space provided by laparoscopic methods might be challenging for patients with severe obesity or other anatomical issues, which can limit access for larger patients. Adequate visualization and access could be difficult to attain in such instances, which might make the treatment more complicated and affect the final result. [25].

Patient and observation

Patient information: A 45 -year-old nonsmoker woman, P1, with previous normal vaginal delivery, with history of menorrhagia and irregular bleeding and presented with history of chronic pelvic pain, dyspareunia, and dysmenorrhea. She Underwent hysteroscopy, endometrial polypectomy, and endometrial biopsy revealing atypical hyperplasia. The cases declined treatment with Mirena IUS at the time of diagnosis. She had history of endometriosis, with attempted hormonal treatment proving ineffective and underwent laparoscopic excision of superficial endometriosis, adhesiolysis, and right salpingo-oophorectomy for ovarian endometrioma; no deep infiltrating endometriosis or bowel involvement was noted. Her cervical smear was normal.
Imaging and Diagnosis: Pre-Operative Imaging (MRI): Mild thickening of the peritoneum noted along the pelvic sidewalls bilaterally with thickening of the round ligaments, suspicion of small bowel adhesions in the right adnexa, retroverted uterus in contact with the rectum, likely representing adhesions from previous endometriosis, no significant deep infiltrating deposits or endometrioma seen, suspicion of small bowel adhesions in the left adnexa.

Surgical Procedures
Cystoscopy and Left Ureteric Catheterization: Normal bladder mucosa observed, two ureteric orifices were on the left side (figure 1); one orifice was seen on the right side, saline cystoscopy performed; Pollock 5 catheter inserted into one left ureter; unable to visualize right ureter adequately.
Laparoscopic Total Hysterectomy and Left Salpingo-Oophorectomy: Uterus instrumented by V Care, indwelling foleys catheter placed, aseptic preparation and 10mm umbilical incision made, Veress needle entry with normal Palmer's test, insufflation pressure maintained at 5-20 mmHg
Laparoscopic Adhesiolysis and Bilateral Ureterolysis: 360° visual entry achieved with ports placed under vision, left sigmoid adhesions were dissected, dissection of the left pelvic brim was performed to visualize the ureters due to anomalies and left ovary adherence to the sidewall, two Left ureters were identified (figure 2), and the infundibulopelvic ligament (IP) was sealed and divided using LigaSure, round ligaments were coagulated and cut on both sides and gently mobilized the bladder inferiorly, difficult dissection on the right side due to previous salpingo-oophorectomy and excessive scarring; right parametrium was fused to the uterus, requiring careful ureterolysis, two ureters were identified on the right side as well (figure 3), uterine vessels were coagulated and cut safely, and colpotomy performed, total hysterectomy was completed using LigaSure; the uterine artery pedicles were coagulated and cut within the V Care after dissecting the uterovesical (UV) peritoneum, colpotomy was done, the specimen was delivered, and the vaginal vault was closed with Vicryl using figure-of-eight sutures at the angles, then continuous suturing of the vault, lavage and hemostasis ensured under low pressure (8 mmHg).

Post-Operative Histopathology: Confirmed focal atypical hyperplasia of the endometrium.
Outcomes: The patient had an uneventful postoperative recovery, with no postoperative ureteral injury or other complications. Pathological examination confirmed the diagnosis of atypical hyperplasia, and the patient remained symptom-free during follow-up.
Patient perspective: Patient refused to give opinion.
Informed consent: written informed consent was obtained from the patient for publication and any accompanying images.

Discussion

laparoscopic hysterectomy is the preferred surgical approach for endometrial atypical hyperplasia, bilateral salpingectomy is also recommended. For premenopausal women, the risks and benefits of oophorectomy should also be fully discussed. Due to the high risk of atypical endometrial hyperplasia combined with endometrial cancer. **[26]**. In the current case study, A 45-year-old woman with a history of persistent endometrial atypical hyperplasia was scheduled for laparoscopic total hysterectomy and left salpingo-oophorectomy. She has a history of laparoscopic excision of pelvic endometriosis and right salpingo-opherectomy. During surgery, bilateral double ureters were incidentally identified.

The presence of this anatomical anomaly required meticulous surgical planning and careful dissection to avoid ureteral injury while ensuring complete removal of the uterus and left adnexa. Despite the complexity introduced by the double ureters and pelvic adhesions, the procedure was successfully performed without compromising ureteral integrity.

The choice of surgical approach in a hysterectomy depends upon clinical circumstances, the surgeon's technical expertise, and patient preference. Although minimally invasive hysterectomies via vaginal and laparoscopic approaches are now preferred due to decreased hospitalization stays and postoperative recovering times, individualized treatment plans for patients should be considered depending on uterine size and the possibility of not achieving adequate exposure, leading to complications **[27]**.

Ureteral duplication is a relatively common condition with a reported incidence of approximately one in 125 (0.8%) people, on the basis of an autopsy series. It is slightly predominant in females, with an estimated ratio of approximately 1.6:1. Unilateral duplication of the ureter is six times more common than bilateral duplication **[28]**.

The use of minimally invasive laparoscopic procedures in gynecologic surgery gained popularity due to quicker recovery, shorter hospital stays as well as lower risk of peri- and post-operative complications. While there is an increasing number of procedures including laparoscopic hysterectomy (LH) **[29]**.

However, there is still a risk of complications related to the technique applied. One of the most intriguing is ureteric injury with a reported incidence of less than 1% worldwide **[30]**.

Conclusion

The unexpected discovery of bilateral double ureters during the procedure posed a significant surgical challenge. In our case, despite the complexity caused by the double ureters and pelvic adhesions, the surgery was completed successfully without compromising the ureters' integrity. This case report highlights the importance of intraoperative vigilance, precise surgical technique, and the ability to adapt to unexpected anatomical variations to ensure patient safety and successful outcomes**.**

REF:

1. Vetter MH, Smith B, Benedict J, Hade EM, Bixel K, Copeland LJ, Cohn DE, Fowler JM, O'Malley D, Salani R, Backes FJ. Preoperative predictors of endometrial cancer at time of hysterectomy for endometrial intraepithelial neoplasia or complex atypical hyperplasia. American journal of obstetrics and gynecology. 2020 Jan 1;222(1):60-e1.
2. Kamii M, Nagayoshi Y, Ueda K, Saito M, Takano H, Okamoto A. Laparoscopic surgery for atypical endometrial hyperplasia with awareness regarding the possibility of endometrial cancer. Gynecology and Minimally Invasive Therapy. 2023 Jan 1;12(1):32-7.
3. Whitten SM, Wilcox DT. Duplex systems. Prenat Diagn. 2001;21:952e957.
4. Davis AA. Transection of duplex ureter during vaginal hysterectomy. Cureus. 2020 Jan;12(1).
5. Chang EJ, Mandelbaum RS, Nusbaum DJ, Violette CJ, Matsushima K, Klar M, Matsuzaki S, Machida H, Kanao H, Roman LD, Matsuo K. Vesicoureteral injury during benign hysterectomy: minimally invasive laparoscopic surgery versus laparotomy. Journal of minimally invasive gynecology. 2020 Sep 1;27(6):1354-62.
6. Ring, K. L., Mills, A. M., & Modesitt, S. C. (2022). Endometrial hyperplasia. *Obstetrics & Gynecology*, *140*(6), 1061-1075.
7. Cong, Q., Luo, L., Fu, Z., Lu, J., Jiang, W., & Sui, L. (2021). Histopathology of women with non-uniform endometrial echogenicity and risk factors for atypical endometrial hyperplasia and carcinoma. *American Journal of Translational Research*, *13*(5), 4500.
8. D'Angelo, E., Espinosa, I., Cipriani, V., Szafranska, J., Barbareschi, M., & Prat, J. (2021). Atypical Endometrial Hyperplasia, Low-grade:"Much ADO About Nothing". *The American Journal of Surgical Pathology*, *45*(7), 988-996.
9. Uccella, S., Zorzato, P. C., Dababou, S., Bosco, M., Torella, M., Braga, A., ... & Garzon, S. (2022). Conservative management of atypical endometrial hyperplasia and early endometrial cancer in childbearing age women. *Medicina*, *58*(9), 1256.
10. Nees, L. K., Heublein, S., Steinmacher, S., Juhasz-Böss, I., Brucker, S., Tempfer, C. B., & Wallwiener, M. (2022). Endometrial hyperplasia as a risk factor of endometrial cancer. *Archives of gynecology and obstetrics*, 1-15.
11. Prip, C. M., Stentebjerg, M., Bennetsen, M. H., Petersen, L. K., & Bor, P. (2022). Risk of atypical hyperplasia and endometrial carcinoma after initial diagnosis of non-atypical endometrial hyperplasia: A long-term follow-up study. *Plos one*, *17*(4), e0266339.
12. Doherty, M. T., Sanni, O. B., Coleman, H. G., Cardwell, C. R., McCluggage, W. G., Quinn, D., ... & McMenamin, Ú. C. (2020). Concurrent and future risk of endometrial cancer in women with endometrial hyperplasia: A systematic review and meta-analysis. *PloS one*, *15*(4), e0232231.
13. Erdem, B., Aşıcıoğlu, O., Seyhan, N. A., Peker, N., Ülker, V., & Akbayır, Ö. (2018). Can concurrent high-risk endometrial carcinoma occur with atypical endometrial hyperplasia?. *International journal of surgery*, *53*, 350-353.
14. Stoenescu, V. E., Niculescu, M., Novac, L., Manolea, M. M., Tomescu, P. I., Dijmărescu, A. L., ... & Iliescu, D. G. (2017). Immunohistochemical reaction of the glandular epithelium in endometrial hyperplasia compared to endometrial carcinoma. *Rom J Morphol Embryol*, *58*(3), 791-800.
15. Jeong, J. Y., Hwang, S. O., Lee, B., Kim, K., Kim, Y. B., Park, S. H., & Choi, H. Y. (2020). Risk factors of progression to endometrial cancer in women with endometrial hyperplasia: A retrospective cohort study. *PLoS One*, *15*(12), e0243064.
16. Zhao, J., Hu, Y., Zhao, Y., Chen, D., Fang, T., & Ding, M. (2021). Risk factors of endometrial cancer in patients with endometrial hyperplasia: implication for clinical treatments. *BMC Women's Health*, *21*, 1-6.
17. Raffone, A., Travaglino, A., Saccone, G., Insabato, L., Mollo, A., De Placido, G., & Zullo, F. (2019). Endometrial hyperplasia and progression to cancer: which classification system stratifies the risk better? A systematic review and meta-analysis. *Archives of Gynecology and Obstetrics*, *299*, 1233-1242.
18. Hutt, S., Tailor, A., Ellis, P., Michael, A., Butler-Manuel, S., & Chatterjee, J. (2019). The role of biomarkers in endometrial cancer and hyperplasia: a literature review. *Acta oncologica*, *58*(3), 342-352.
19. Lax, S. F. (2017). Pathology of endometrial carcinoma. *Molecular Genetics of Endometrial Carcinoma*, 75-96.
20. Chandra, V., Kim, J. J., Benbrook, D. M., Dwivedi, A., & Rai, R. (2016). Therapeutic options for management of endometrial hyperplasia. *Journal of gynecologic oncology*, *27*(1).
21. Travaglino, A., Inzani, F., Santoro, A., Arciuolo, D., Piermattei, A., Pasquini, S., ... & Zannoni, G. F. (2021). Endometrial metaplastic/reactive changes coexistent with endometrial hyperplasia and carcinoma: a morphological and immunohistochemical study. *Diagnostics*, *12*(1), 63.
22. Zhang, C., Wang, E. Y., Liu, F., Sung, C. J., Quddus, M. R., Ou, J., ... & Lawrence, W. D. (2018). Routine histologic features in complex atypical hyperplasia can predict the presence of endometrial carcinoma: a clinicopathological study of 222 cases. *Human pathology*, *80*, 40-46.
23. Metin, M. R., Aydın, H., Ünal, Ö., Akçay, Y. A. S. E. M. İ. N., Duymuş, M., Türkyılmaz, E., & Avcu, S. E. R. H. A. T. (2016). Differentiation between endometrial carcinoma and atypical endometrial hyperplasia with transvaginal sonographic elastography. *Diagnostic and interventional imaging*, *97*(4), 425-431.
24. Kiraz, A., Açmaz, G., Uysal, G., Unal, D., & Dönmez-Altuntas, H. (2016). Micronucleus testing as a cancer detector: endometrial hyperplasia to carcinoma. *Archives of gynecology and obstetrics*, *293*, 1065-1071.

25. Russo, M., Newell, J. M., Budurlean, L., Houser, K. R., Sheldon, K., Kesterson, J., ... & Warrick, J. I. (2020). Mutational profile of endometrial hyperplasia and risk of progression to endometrioid adenocarcinoma. *Cancer*, *126*(12), 2775-2783.

26. Neis KJ, Zubke W, Fehr M, Römer T, Tamussino K, Nothacker M. Hysterectomy for benign uterine disease. Deutsches Ärzteblatt International. 2016 Apr;113(14):242.
27. Rodriguez MG, Mehra D, Saroop S, Srivastav A. Abdominal Supracervical Hysterectomy With Bilateral Salpingo-Oophorectomy as the Surgical Approach for a 22-Week Uterus With Incidental Endometrial Polyp Focal Atypia. Cureus. 2020 Sep;12(9).
28. Tanaka Y, Koyama S, Shiki Y. Duplicated ureter diagnosed during total laparoscopic hysterectomy. Gynecology and Minimally Invasive Therapy. 2013 Aug 1;2(3):99-100.
29. Huang WY, Huang KH, Chang WC, Wu SC. Temporal trend and nationwide utility for hysterectomies in Taiwan, 1997–2010. Taiwanese Journal of Obstetrics and Gynecology. 2016 Oct 1;55(5):659-65.
30. Kiran A, Hilton P, Cromwell DA. The risk of ureteric injury associated with hysterectomy: a 10-year retrospective cohort study. BJOG: An International Journal of Obstetrics & Gynaecology. 2016 Jun;123(7):1184-91.

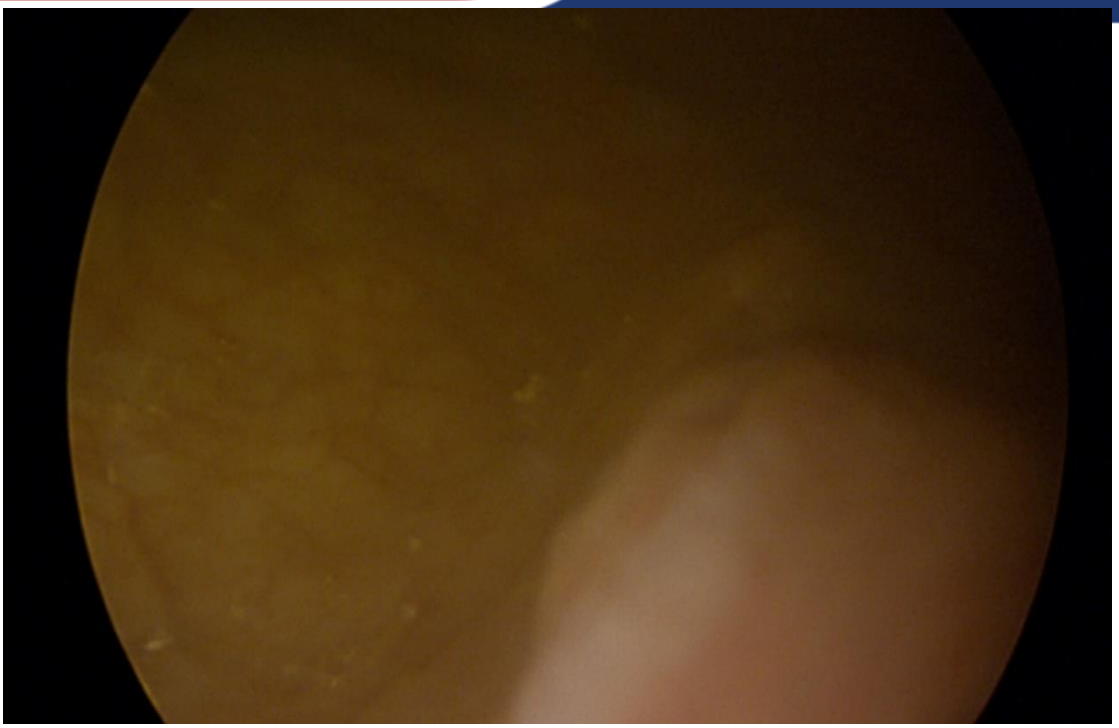

Figure 1: Cystoscopy: Two ureteric orifices were on the left side.

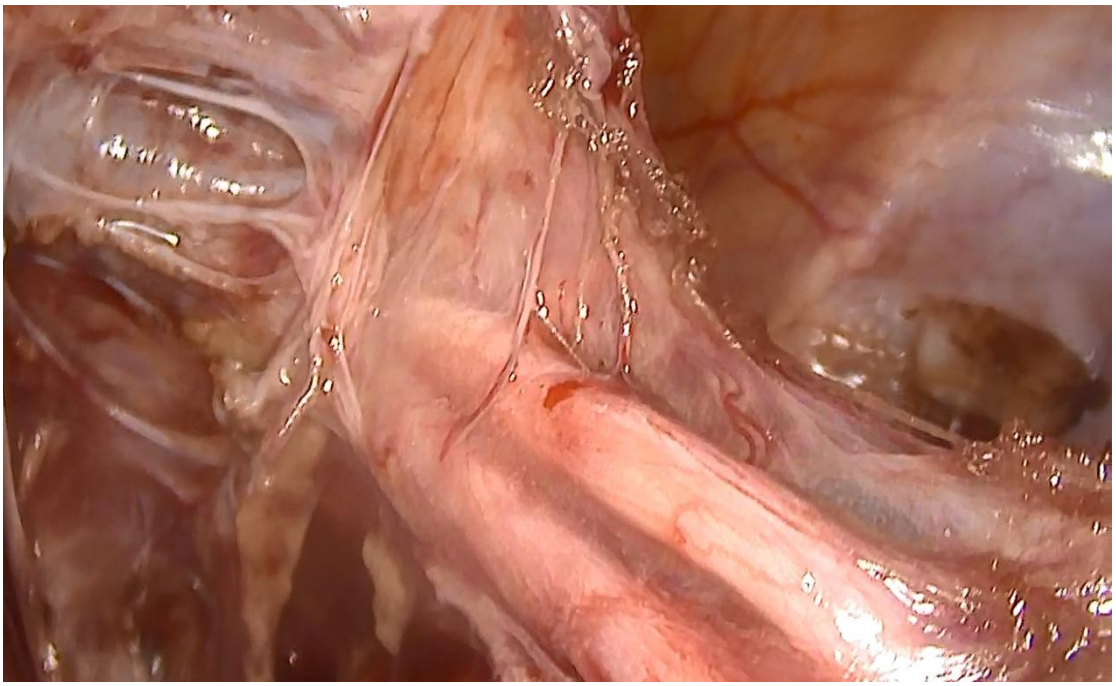

Figure 2: Laparoscopy: Two ureters were identified on left side

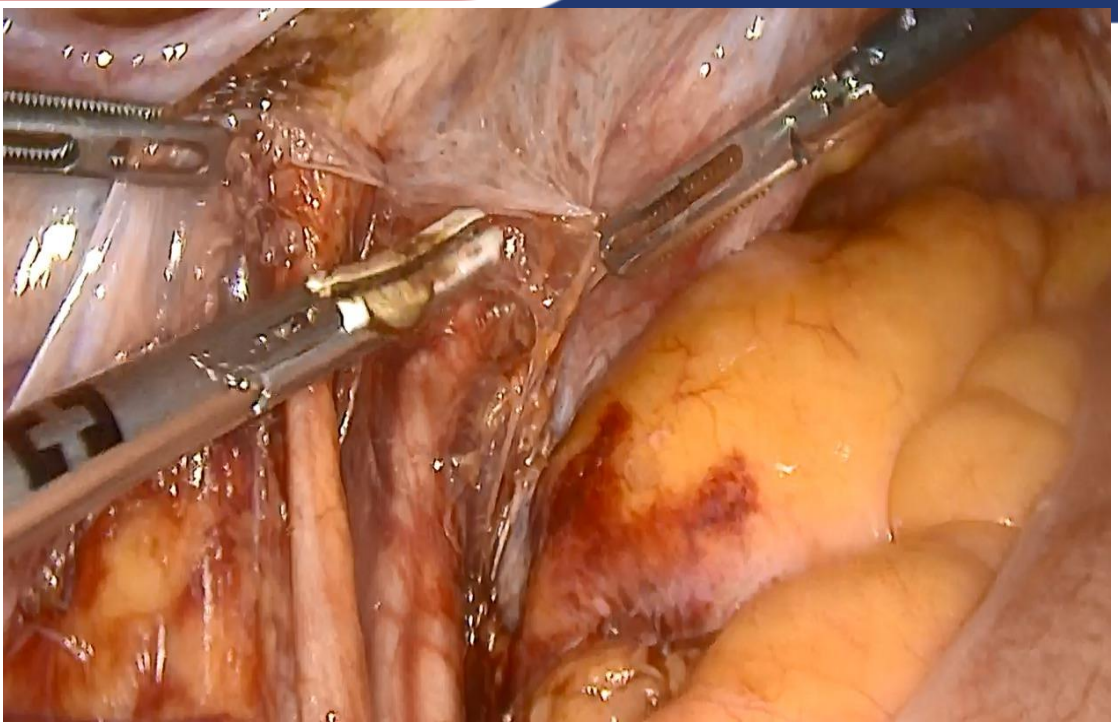

Figure 3: Laparoscopy: Two ureters were identified on the right side