Infertility Associated with Unicornuate Uterus and Non-Communicating Rudimentary Horn: A Case Series Highlighting Diagnostic Challenges and Laparoscopic Management

Maybelline R. Estroso, MD, FPOGS and
Marie Janice Alcantara – Boquiren, M.D. MSc, FPOGS, FPSRM, FPSGE
Section of Reproductive Endocrinology and Infertility, Mindanao Center for Reproductive Medicine, Davao City, Davao Del Sur, Philippines

Abstract

A unicornuate uterus with a non-communicating rudimentary horn is a rare Müllerian duct anomaly that is frequently underdiagnosed because of its variable clinical presentation and the limitations of conventional imaging modalities. Although not considered a direct cause of infertility, it may coexist with other reproductive pathologies and contribute to adverse reproductive outcomes. Presented here is a case series of three infertile women aged 30–36 years who were diagnosed with a unicornuate uterus and non-communicating rudimentary horn during fertility evaluation. Patient A presented with primary infertility, cyclic pelvic pain, endometriosis, and bilateral tubal disease; Patient B had a seven-year history of primary infertility and was initially suspected to have unilateral tubal obstruction; and Patient C was referred with a presumed diagnosis of uterine didelphys and was subsequently found to have a unicornuate uterus with a non-communicating rudimentary horn and ipsilateral renal agenesis. In all three cases, preoperative imaging failed to establish the definitive diagnosis, which was confirmed intraoperatively through laparoscopy, chromotubation, and hysteroscopy. Patients A and B underwent laparoscopic excision of the rudimentary horn with ipsilateral salpingectomy, while Patient C underwent only ipsilateral salpingectomy. Hysteroscopic transillumination was utilized in one case to facilitate safe laparoscopic dissection and delineation of the hemiuterine anatomy. All patients had uneventful postoperative recovery and were subsequently counseled regarding fertility options. This case series highlights the diagnostic challenges posed by unicornuate uterus with a non-communicating rudimentary horn, emphasizes the importance of a high index of suspicion during infertility work-up, and demonstrates the value of minimally invasive surgical management and hysteroscopic transillumination in selected cases. Early recognition and individualized treatment may help reduce reproductive complications and improve fertility counseling and management.

Key words: uterine abnormalitie, female infertility, laparoscopy

Introduction

A unicornuate uterus occurs in approximately 1 in 1000 to 1 in 5400 women, with 74% of those women having a rudimentary horn that may or may not communicate with the unicornuate uterus.[1] It accounts for 5-20% in women with recurrent miscarriages resulting from Mullerian duct anomalies.[1] Clinical presentation depends on the particular subtype present. A noncommunicating horn, and absent endometrium or noncavitary accounts for 33% of patients with a unicornuate uterus.[2] Women with unicornuate uterus often present asymptomatically to gynecologist during evaluation for recurrent pregnancy loss, imaging for

For correspondence: maybz0524@gmail.com

another indication, during pregnancy, or at the time of cesarean delivery. Among women subsequently diagnosed with rudimentary horns, the presenting symptoms included ectopic pregnancy in 25% of cases, chronic pelvic pain in 20%, pelvic masses in 20%, and primary infertility in 15%.[3] Women with unicornuate uterus have a more difficult time achieving conception, with a relative risk for conception of 0.74 when compared to controls.[4]

Congenital uterine anomalies are associated with a spectrum of adverse reproductive and obstetric outcomes; however, they are not considered an inherent cause of infertility. Their prevalence is significantly higher among women with poor reproductive outcomes, with miscarriage rates reported at approximately 13%. This prevalence increases further, reaching 24.5% among women with a history of infertility and recurrent pregnancy loss. When identified during an infertility workup, congenital uterine anomalies are generally not regarded as the primary cause of infertility, but rather as an additional factor that may complicate fertility treatment and subsequent pregnancy outcomes.[1]

Their presence becomes particularly relevant when planning fertility interventions that carry an increased risk of multifetal gestation, such as ovarian stimulation and in vitro fertilization (IVF). Multifetal pregnancies in women with uterine anomalies may be associated with heightened risks of obstetric complications due to limited uterine capacity and abnormal uterine architecture.[1]

This case series aims to contribute to the limited local data on the incidence and clinical presentation of unicornuate uterus with a rudimentary horn, thereby enhancing one's understanding of this complex group of Müllerian duct anomalies. It highlights the importance of accurate preoperative classification through hysterosalpingography, ultrasonography, magnetic resonance imaging (MRI), or a combination of these modalities, emphasizing the complementary strengths and inherent limitations of each technique.

In addition, this report discusses the individualized surgical management of affected patients, including the selection of candidates for rudimentary horn excision, ipsilateral salpingectomy, or both. The role of hysteroscopic transillumination (diaphanoscopy) as an adjunct to laparoscopic dissection is also explored as a valuable technique for delineating uterine anatomy and facilitating safe surgical excision.

The Case

Case 1

Patient A is a 30 year old, nulligravid woman, who complained of severe cyclic abdominal pain for three months. She has no known comorbidities. She has no known family history of mullerian anomalies. She has been married for four years. She has irregular menstruation with a range of 23 – 52 days, lasting for 7-14 days, using 3-4 pads/day, moderately soaked, and associated with dysmenorrhea. Her coitarche is at 26 years old with 1 sexual partner. Initial fertility work-up was done three years prior to the admission. Hysterosalpingogram during that time revealed a possibility of Mullerian duct anomaly with contrast seen preferentially filling the left cornua but no peritoneal spill was noted, considering tubal block or spasm. The right fallopian tube was not opacified. Correlation with pelvic MRI and ultrasound was requested. Results of MRI were inconclusive and showed no abnormality during the scan. A 2D ultrasound revealed a small, simple ovarian cyst on the right ovary – a functional cyst with prominent mesosalpinx noted in the right adnexa. She was advised to undergo surgery for further investigation, but was lost to follow-up. Two weeks before admission, the patient consulted for fertility work-up with complaints of severe cyclic abdominal pain. Transvaginal ultrasound revealed a normal-sized anteverted uterus with proliferative endometrium, polycystic right ovary, and a left endometrial cyst that measured 5.8cm x 5.5cm x 4.3cm. Repeat hysterosalpingogram revealed a uterus deviated to the left, banana-shaped, and a distally blocked left fallopian tube with focal dilatation. No opacification was noted on the right fallopian tube (Figure 1). The patient was advised surgery.

Patient was noted to be overweight, with a BMI of 23. Breast examination was unremarkable. Her abdomen was soft, flabby and non-tender with no palpable masses noted. On bimanual pelvic examination, the introitus admits two fingers, cervix was closed and smooth, uterus was not enlarged, but there was tenderness on the right adnexa on deep palpation. The working diagnosis at this time was

Pelvic Endometriosis with left endometriotic cyst, Abnormal Uterine Bleeding probably secondary to Endometrial Polyp. The patient and her family were properly counseled regarding her condition and all the possible treatment options, and the patient consented for surgery. During the laparoscopic survey, adhesions between the omentum, large intestines, and the right abdominal wall were noted (Figure 2). Perihepatic adhesions were observed (Figure 3). Filmy and dense adhesions were present between the omentum, sigmoid colon and both fallopian tubes. Chromotubation with methylene blue dye showed no egress, and the left fallopian tube was cystically dilated (8.5cm x 2.5cm) and filled with chocolate-like fluid (Figure 4A). The right fallopian tube measured 9cm x 1.5cm (Figure 4B). Periadnexal adhesions were noted on both sides. The uterus appeared normal in size but was deviated to the left, with a firm 0.5cm x 0.5cm mass on the posterior right fundus (myoma uteri) and multiple superficial endometrial implants. The posterior cul-de-sac was clear, and a retraction pocket with black endometrial implants was found lateral to the left utero-sacral ligament (Figure 5). A mass measuring 2cm x 2cm x 1.5cm attached to the right superolateral fundus, contiguous with nearby structures, with its pedicle measuring 2cm x 1cm was noted (right rudimentary horn) (Figure 6). The left and right ovaries appeared grossly normal. The patient underwent operative laparoscopy, adhesiolysis, bilateral salpingo-ovariolysis, chromotubation, bilateral salpingectomy, diaphanoscopy, excision of the right rudimentary horn, lysis and fulguration of endometriotic implants. Diaphanoscopy post-excision showed about 1-1.5 cm residual myometrial thickness. Hysteroscopy revealed a single cervix with no lesions (Figure 7A), multiple endometrial polyps and a tubular left hemi-uterine cavity . Hysteroscopy-guided polypectomy was done. The patient tolerated the procedure well without complications.

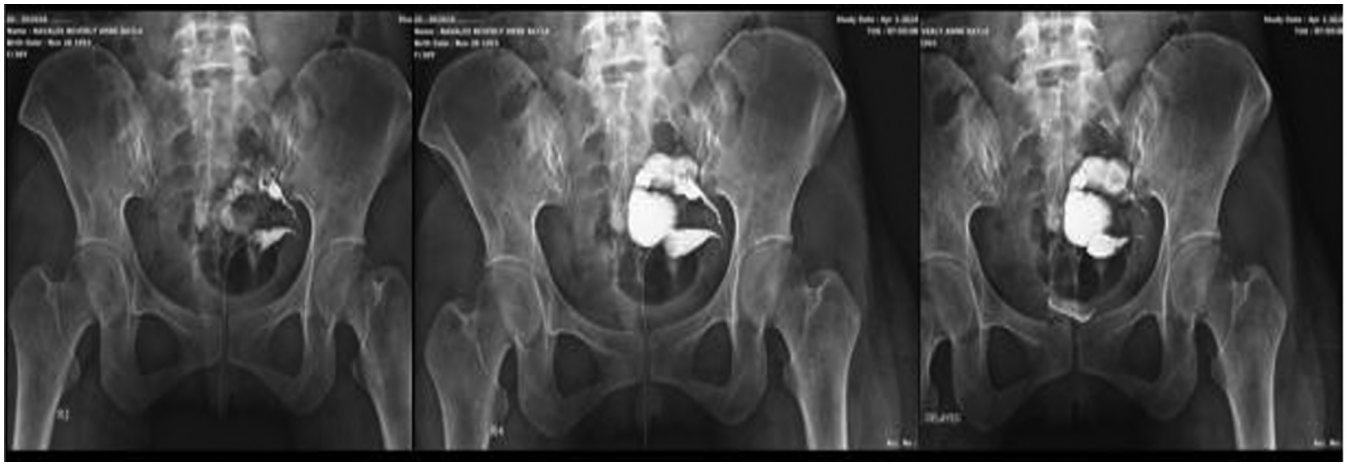

Figure 1. Hysterosalpingogram revealed a uterus deviated to the left, banana-shaped, and a distally blocked left fallopian tube with focal dilatation. No opacification was noted on the right fallopian tube.

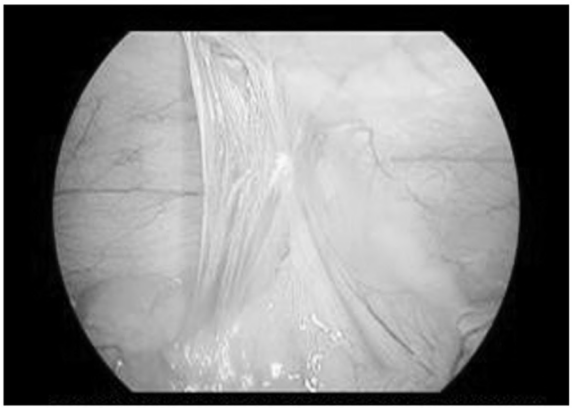

Figure 2. Adhesions between the omentum, large intestines, and the right abdominal wall were noted.

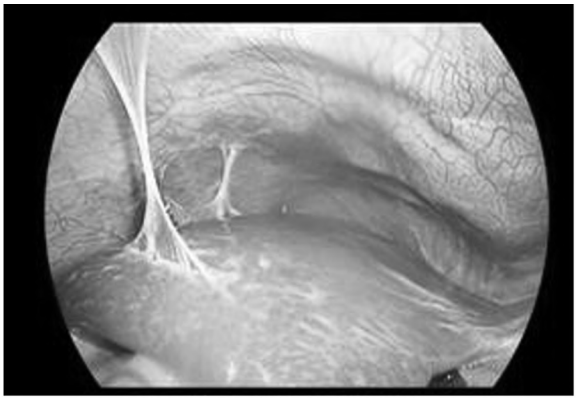

Figure 3. Perihepatic adhesions were observed.

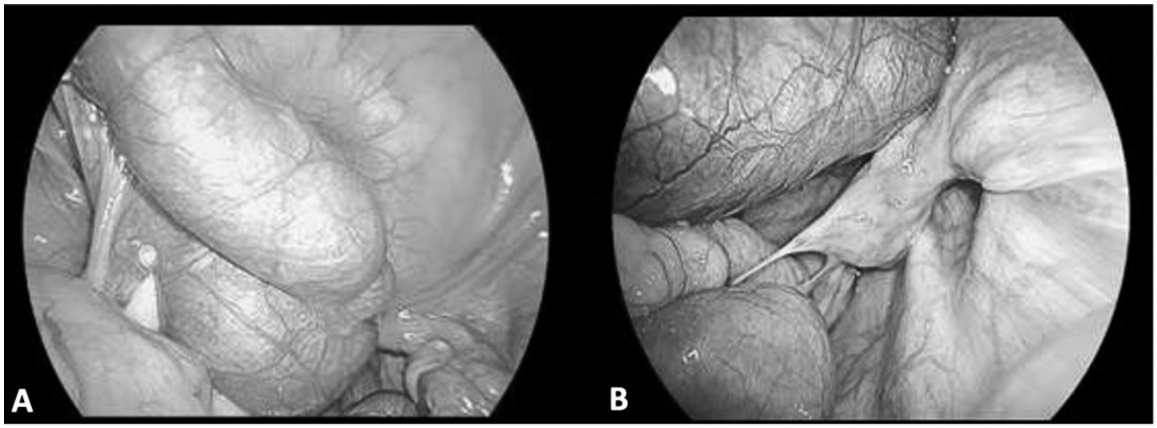

Figure 4. Chromotubation with methylene blue showed no dye egress, and the left fallopian tube (A) was cystically dilated (8.5cm x 2.5cm) and filled with chocolate-like fluid. The right fallopian tube (B) was cystically dilated and measured 9cm x 1.5cm.

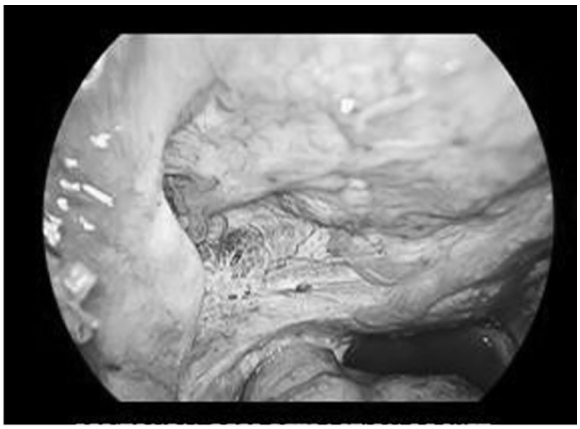

Figure 5. A retraction pocket with black endometrial implants was found lateral to the left utero-sacral ligament.

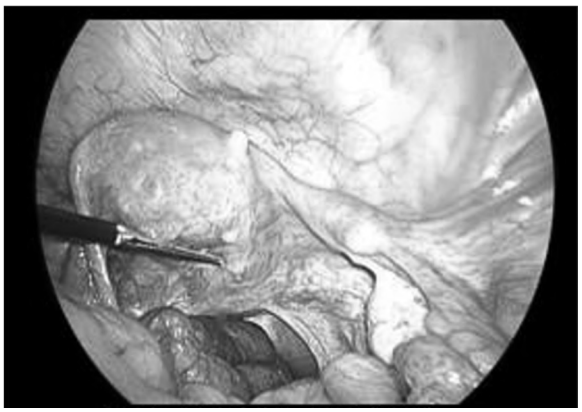

Figure 6. A mass measuring 2cm x 2cm x 1.5cm attached to the right superolateral fundus, contiguous with nearby structures, with its pedicle measuring 2cm x 1cm was removed (right rudimentary horn.

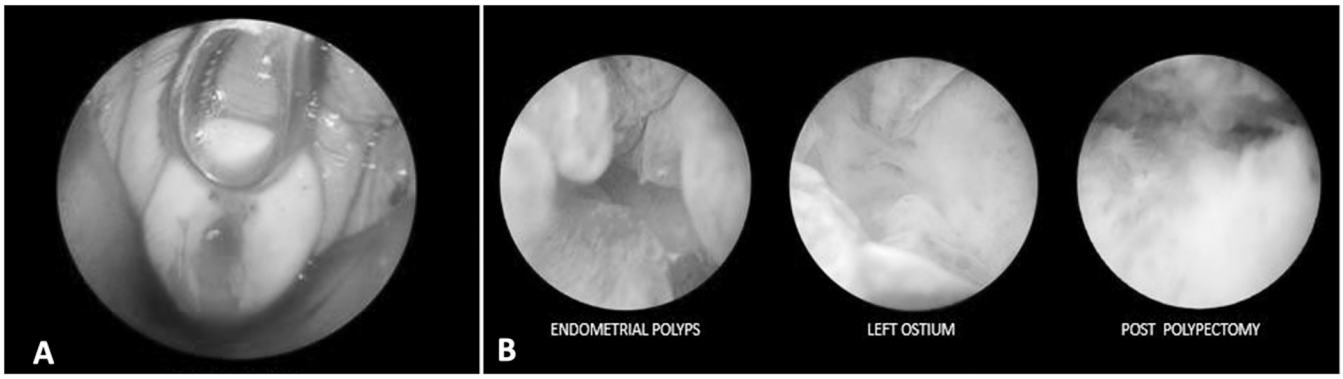

Figure 7. Hysteroscopy revealed a single cervix with no lesions (Figure 7A), and multiple endometrial polyps measuring up to 0.6cm x 0.6cm and a tubular left hemi-uterine cavity post-polypectomy (Figure 7B).

Biopsy revealed the following results: left fallopian tube: congestion and hemorrhage; right fallopian tube: congestion and hemorrhage, leiomyoma uterine mass, endometrial tissue biopsy: suggestive of endometrial polyp. KUB ultrasound revealed no anomaly and presence of two kidneys. Semen analysis revealed teratozoospermia. She was counseled regarding the need for IVF to achieve pregnancy and is currently still preparing financially for this procedure.

Case 2

Patient B is a 36 year old nulligravid, married, who consulted for inability to conceive for seven years. She is a known case of Bronchial Asthma, controlled and on salbutamol nebulization as needed. She has no known family history of Müllerian anomalies. She has been married for one year but cohabitated with her husband for seven years. She has a regular menstrual cycle with a 4-5 day duration, moderately soaking 2-3 sanitary pads/day with occasional dysmenorrhea. She had her coitarche at 22 years old with 2 sexual partners. She denies history of sexually transmitted infections. Three years prior to admission, the patient consulted a private obstetrician where an initial fertility workup was done. She reported a three-year history of unsuccessful attempts at natural conception prior to seeking medical consultation. A pelvic ultrasound performed at that time was reportedly unremarkable. She was subsequently prescribed clomiphene citrate, and follicular monitoring was undertaken. Despite ovulation induction and fertility evaluation, conception was not achieved. Thereafter, she did not pursue further follow-up and remained off fertility medications.

Three months prior to admission, the couple consulted a fertility specialist. Transvaginal sonography revealed a normal-sized anteverted uterus with proliferative phase endometrium, and endometrial polyp which measured 1.2cm x 0.7cm; the ovaries were normal with a dominant follicle on the right. The Anti-Mullerian Hormone was at 3.37 ng/mL. Hysterosalpingogram revealed normal visualization of the upper one-third of the uterine cavity, while the lower two-thirds was not clearly visualized. The injected contrast medium spills freely into the peritoneal cavity but with preferential flow into the normal right fallopian tube. There was no egress noted on the left fallopian tube. The air-filled bowel loops were outlined by the contrast medium. With this result, a blockage on the left fallopian tube was taken into consideration. (Figure 8) She was then advised Diagnostic Laparoscopy. Upon admission, she was noted to be obese with a BMI of 27.1. Breast examination was unremarkable. Her abdomen was soft, flat, non-tender without palpable masses. Speculum exam revealed a single cervix that is pinkish with smooth and regular borders. Bimanual examination was unremarkable. Her preoperative laboratory results were all unremarkable. On laparoscopy, the omentum was adherent to the right pelvic peritoneum and the ampullary portion of the right fallopian tube, requiring adhesiolysis. The uterus appeared smooth and not enlarged. A 2cm × 3cm left-sided mass, consistent with a rudimentary uterine horn, was identified and was contiguous with a grossly normal left fallopian tube. There was a 0.5cm x 0.5cm paratubal cyst noted on the right fallopian tube. Chromotubation showed egress of methylene blue dye from the fimbrial end of the right fallopian tube. (Figure 9). Adhesiolysis, excision of right paratubal cyst, excision of the left rudimentary horn, and left salpingectomy were done. On hysteroscopy (Figure 10), there was a 1cm x 2cm polypoid mass in the endometrial cavity. The right ostium was patent, while the left was absent, confirming a diagnosis of non-communicating rudimentary horn. Hysteroscopy-guided polypectomy was done. Histopathology results showed the following results: a left fallopian tube, normal myometrium, fibrous adhesions on the uterine serosa, paratubal cyst and endometrial polyp.

Patient was discharged well after 48 hours. KUB ultrasound revealed no anomalies. Semen analysis revealed teratozoospermia with a total sperm count of 89.6 x 10^6 and total motile sperm count of 58.24 x 10^6. As of this writing, the patient is 3 years post-op, and still unable to get pregnant.

Case 3

Patient C is a 31year old nulligravid who came in for fertility work-up. She is married for 5 years and had been trying to conceive. Initial ultrasound done upon consult with a general obstetrician

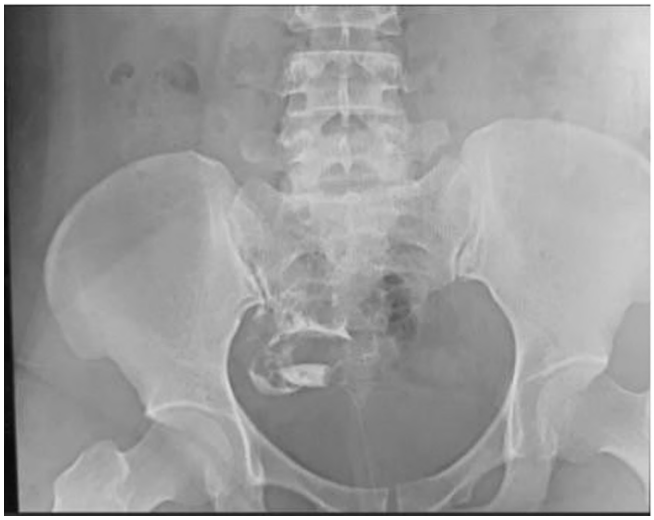

Figure 8. Hysterosalpingogram revealed normal visualization of the upper one-third of the uterine cavity, while the lower two-thirds was not clearly visualized. The injected contrast medium spills freely into the peritoneal cavity but with preferential flow into the normal right fallopian tube. There was no egress noted on the left fallopian tube.

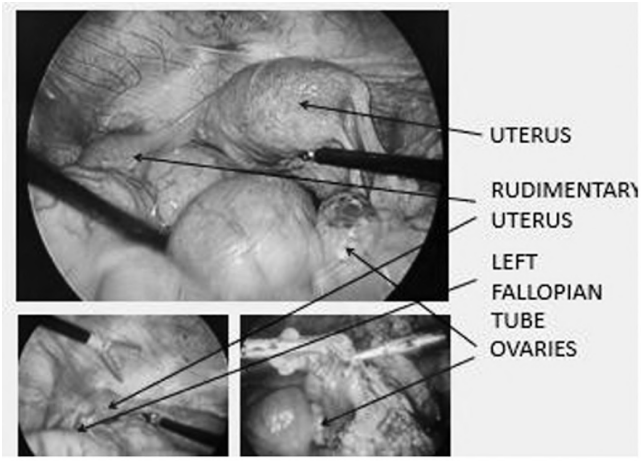

Figure 9. On laparoscopy, the uterus appeared smooth and not enlarged. A 2cm × 3cm left-sided mass, consistent with a rudimentary uterine horn, was identified and was contiguous with a grossly normal left fallopian tube. There was a 0.5cm x 0.5cm paratubal cyst noted on the right fallopian tube. Chromotubation showed egress of methylene blue dye from the fimbrial end of the right fallopian tube.

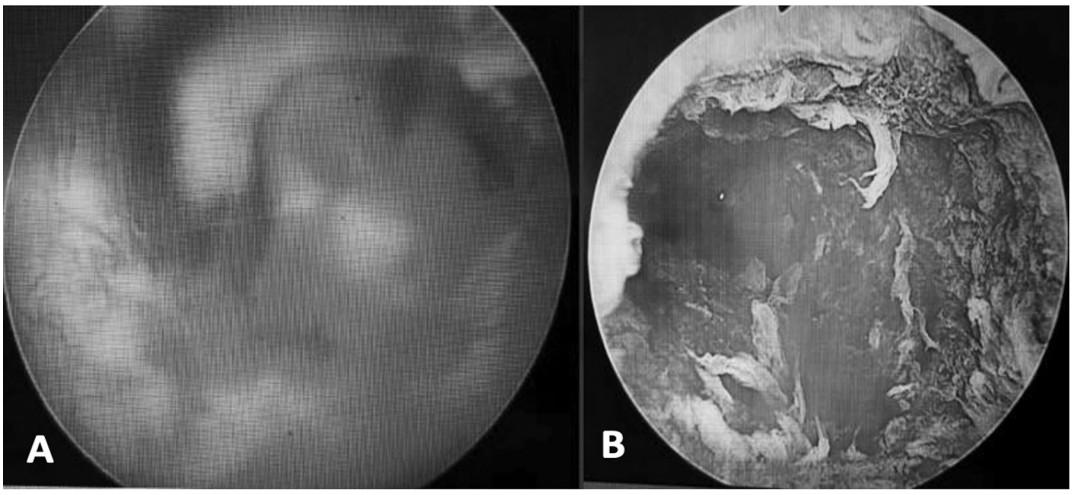

Figure 10. On hysteroscopy, there was a 1cm x 2cm polypoid mass (A) in the endometrial cavity. The right ostium was patent (B), while the left was absent, confirming a diagnosis of non-communicating rudimentary horn.

revealed uterine didelphys, hence she was referred to a fertility specialist. She has no known comorbidities. She is regularly menstruating lasting 5-7 days with occasional dysmenorrhea. Her husband is a seafarer assigned at the engine department and leaves once a year with four months stay. Sexual intercourse is twice a week. She is a housewife, a non-smoker, non-alcoholic beverage drinker. On physical examination, her abdomen was soft and flabby, with no palpable masses nor tenderness. On internal examination, the cervix was firm and closed, uterus was normal in size, with no adnexal mass nor tenderness. Parametria were free, with no nodularities in the posterior culdesac on rectovaginal examination. A 3D transvaginal ultrasound showed bicorporeal uterus with 2 normal cervices and longitudinal obstructing vaginal septum suggestive of Uterine Didelphys. KUB ultrasound showed absent right kidney with consideration of OHVIRA syndrome. Urinalysis and serum creatinine were normal..

The patient underwent operative laparoscopy. Intraoperative findings revealed smooth liver with adhesions, and the omentum was densely adhered to both adnexa and the posterior uterine wall. There was a left hemiuterus with a non-communicating, non-functioning right rudimentary cavity (Figure 11). The uterus appeared pinkish and anteverted, while the left ovary and fallopian tube were normal but had adhesions to the pelvic sidewall. The right fallopian tube and ovary were also normal, but a sausage-shaped pseudocyst was noted on the right fallopian tube. Chromotubation showed egress of dye from the left fallopian tube. Adhesiolysis and right salpingectomy were done. On diagnostic hysteroscopy, there was a single cervix visualized, a thin endometrium, with no endometrial masses noted.

Discussion

Mullerian abnormalities are reported in 0.17% of fertile women and 3.5% of infertile women, while a unicornuate uterus is found in 0.4% of women.[5] According to the American Fertility Society, there are four variants of unicornuate uterus classified based on the presence or absence of horn, whether it is communicating or non-communicating horn, and whether it is non-functional. Seventy-four to ninety percent of these women with a unicornuate uterus will have an associated rudimentary horn that may or may not communicate with the unicornuate uterus.[1]

Mullerian anomalies are caused by incomplete development of the mullerian ducts during weeks 7 and 8 of gestation, which is further complicated by a variable failure of developmental progression and fusion up to 14 weeks gestation.[6] Unicornuate uteri with a rudimentary horn are caused by the normal development of one mullerian duct combined with failure of the contralateral duct to elongate or reach the urogenital sinus, which forms the lower third of the vagina. A right-sided predominance of non-communicating rudimentary horns has been reported in the literature and may be attributed to slightly earlier development of the left Müllerian duct compared with the right.[1] In the present case series, Patients A and C exhibited right-sided non-communicating rudimentary horns, consistent with previously published observations. A review of 366 cases[7] of rudimentary uterine horns reported that the mean age at presentation was in the early twenties, regardless of whether patients presented with gynecologic or obstetric complaints (23 and 26 years, respectively). In contrast, the patients in this case series were older, ranging from 30 to 36 years of age. This difference may be attributable to the fact that all three patients were diagnosed during infertility evaluation, which is more commonly undertaken during the third and fourth decades of life, when reproductive concerns become a primary reason for seeking medical consultation.

When a non-communicating rudimentary uterine horn is suspected, magnetic resonance imaging (MRI) is generally considered the preferred imaging modality. Its advantages include being non-invasive, providing detailed assessment of both the internal and external uterine morphology, and aiding in the identification of functional endometrium

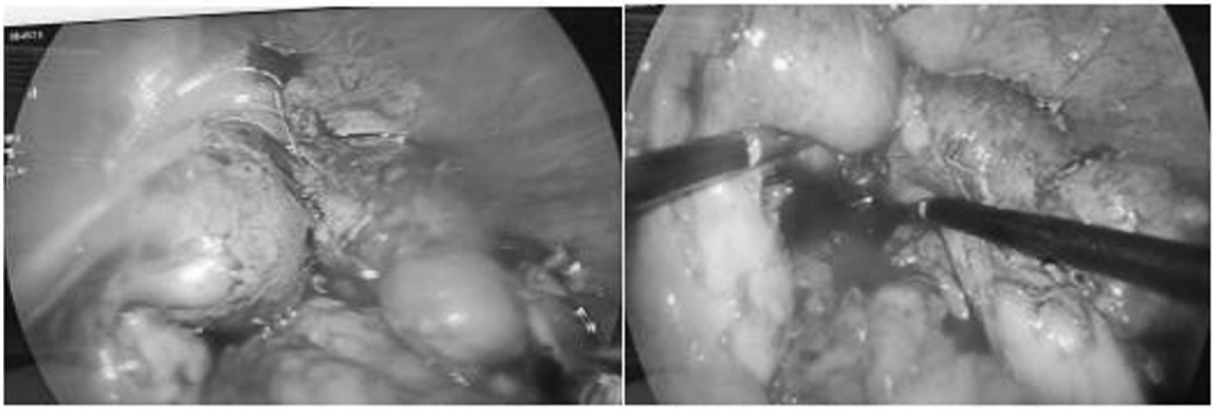

Figure 11. Intraoperative findings revealed an omentum that was densely adhered to both adnexa and the posterior uterine wall. There was a left hemiuterus with a non-communicating, non-functioning right rudimentary horn.

within the rudimentary horn. MRI may also help predict the extent of myometrial continuity between the rudimentary horn and the unicornuate uterus, thereby facilitating preoperative planning.[1] Reported sensitivities of MRI for the evaluation of surgically confirmed Müllerian anomalies range from 73% to 100%. However, MRI is not without limitations. It may fail to detect certain lateral fusion defects, and distinguishing between septate and bicornuate uteri can be challenging, often depending on the expertise of the interpreting radiologist.[1] In the present case series, MRI was not performed in any of the three patients due to financial constraints

The emergence of three-dimensional (3D) ultrasonography has provided an additional diagnostic tool for the evaluation of Müllerian anomalies, with reported sensitivity and specificity of 98–100% and 100%, respectively. Although MRI remains the gold standard for the diagnosis of Müllerian anomalies, advances in 3D ultrasonography may position it as a comparable, and potentially preferred, first-line imaging modality in the future.[1]

Prior to the widespread availability of MRI and advanced ultrasonography, hysterosalpingography (HSG) and surgical exploration were the primary methods used for the diagnosis and classification of Müllerian anomalies.[8] However, conventional ultrasonography has been reported to have a sensitivity of only 26% for detecting a rudimentary uterine horn.[7] HSG also has several limitations, including restricted use in young or virginal patients, exposure to ionizing radiation and contrast media, and limited ability to accurately differentiate among uterine anomaly subtypes.[9] While laparoscopy and laparotomy provide direct visualization of pelvic anatomy and remain highly accurate diagnostic tools, both are invasive procedures associated with inherent surgical risks. In selected cases, laparoscopy with chromotubation may be necessary to confirm the diagnosis and precisely delineate the anatomy of complex Müllerian anomalies.[9]

The surgical excision of a rudimentary horn is generally recommended for three principal reasons: (1) To relieve dysmenorrhea associated with the presence of functional endometrium; (2) To prevent the development or progression of endometriosis resulting from retrograde menstruation through the ipsilateral fallopian tube; and (3) to eliminate the risk of a rudimentary horn pregnancy. Collectively, these interventions aim to alleviate symptoms, reduce future gynecologic and obstetric complications, and preserve reproductive potential. In all three cases presented, ipsilateral salpingectomy was performed partly to prevent the occurrence of a rudimentary horn pregnancy, a rare but potentially life-threatening condition associated with significant maternal morbidity.[10,11,12]

Given the high reported incidence of associated renal anomalies in patients with unicornuate uterus and rudimentary horn (31–100%), most authors recommend preoperative evaluation of the urinary tract. Renal imaging is important not only for identifying concomitant renal malformations but also for facilitating surgical planning and minimizing the risk of ureteral injury. Intravenous urography may be useful in delineating the number and course of the ureters. In the present case series, however, assessment for associated renal anomalies was performed using kidney–ureter–bladder (KUB) ultrasonography.[11,12]

Additional preoperative considerations include determining the degree of myometrial continuity between the rudimentary horn and the unicornuate uterus, as this may influence the need for laparoscopic reconstruction and suture repair of any residual myometrial defect following horn excision. Other factors that may affect surgical complexity include the presence of a uterine or adnexal mass, associated cervical or vaginal anomalies, duration of symptoms, and a history of previous abdominal or pelvic surgery. Careful evaluation of these factors can help anticipate technical challenges and facilitate operative planning.[11,12] In the three cases presented, the degree of myometrial connection between the rudimentary horn and the unicornuate uterus was not established preoperatively. In Patient A, however, hysteroscopic transillumination (diaphanoscopy) was utilized intraoperatively to better delineate the relationship between the uterine structures and assess the extent of myometrial continuity, thereby aiding surgical dissection and excision.

Laparoscopic excision is currently considered the standard approach for the management of a rudimentary uterine horn. The advantages of minimally invasive surgery include reduced postoperative pain, shorter hospital stay, faster recovery, and improved cosmetic outcomes.[11] The primary objective of surgery is to clearly define

the Müllerian anatomy and safely excise, the rudimentary horn while preserving the integrity of the unicornuate uterus. When the diagnosis remains uncertain, chromotubation using methylene blue dye may be performed to confirm the non-communicating nature of the anomaly. Visualization of dye efflux from the patent fallopian tube, with absence of spillage from the affected side, supports the diagnosis of a non-communicating rudimentary horn. This technique was employed in all three patients and was instrumental in confirming the diagnosis intraoperatively.[11]

Careful assessment of the anatomical relationship between the rudimentary horn and the unicornuate uterus is essential prior to excision. The rudimentary horn may exist as a completely separate structure, be connected by a thin fibrous band, or be broadly fused with the unicornuate uterus. When the horn is attached by a fibrous band, its vascular supply is typically derived from the ipsilateral uterine artery, with the feeding vessels coursing beneath the band. In such cases, identification, coagulation, and ligation of these vessels are generally straightforward.[13] In contrast, when the rudimentary horn is broadly fused to the unicornuate uterus, particularly at the level of the lower uterine segment, surgical dissection becomes more challenging and achieving hemostasis may be more difficult. In these cases, the rudimentary horn often receives a dual blood supply from both the ipsilateral uterine artery and the arcuate vessels arising from the contralateral uterine artery through the intervening myometrium. Therefore, meticulous identification and coagulation of these vascular connections are necessary before proceeding with dissection to minimize intraoperative blood loss and preserve the integrity of the remaining uterus.[13]

The surgical steps of resection are similar to that of a laparoscopic hysterectomy. First, the round and utero-ovarian ligaments and isthmic portion of the ipsilateral fallopian tube are transected on the side of the functional, non-communicating horn. The broad ligament is incised enabling entrance into the retroperitoneal space to identify the ipsilateral ureter - remembering the common associations or uterine anomalies with urologic anomalies. The vascular pedicle of the uterine horn may also be identified. The ureterovesical peritoneal fold is then incised and the bladder reflected. Once this is accomplished, the uterine vessels for the non-communicating horn are coagulated and transected. Attention can then be turned to transecting the horn from the remaining unicornuate uterus. This has been accomplished by a variety of techniques – a laparoscopic stapling device, bipolar cautery and Harmonic scalpel. The ultrasonic energy scalpel has been reported to allow more accurate and easier dissection. The ipsilateral fallopian tube should be removed along with the horn to decrease the risk of ectopic pregnancy.[13]

The principal surgical challenge in the management of a non-communicating rudimentary horn lies in its separation from a densely fused unicornuate uterus. Surgical dissection should prioritize preservation of the functional hemiuterus while ensuring complete excision of all tissues associated with the rudimentary horn. Incomplete resection may leave residual functional endometrial or cervical tissue, which can subsequently result in cyclic pain, hematometra, or recurrent symptoms years after the initial surgery.[14,15,16]

In cases of broad myometrial fusion, hysteroscopic transillumination (diaphanoscopy) may serve as a valuable adjunct to laparoscopic surgery by clearly delineating the boundary between the rudimentary horn and the functional hemiuterus, thereby facilitating precise dissection and minimizing inadvertent injury to the remaining uterus.[15,16,17] Following excision, laparoscopic closure of the residual myometrial defect is generally recommended when significant myometrial disruption is present, as this may reduce the risk of future uterine rupture. Studies have suggested that a residual uterine wall thickness of less than 5 mm may be associated with an increased risk of hemiuterine rupture.[15,16,17,18] In Patients A and B, the rudimentary horn was connected to the unicornuate uterus only by a thin fibrous band, resulting in minimal myometrial disruption and obviating the need for myometrial reconstruction.

Several surgical techniques have been described to minimize complications during laparoscopic horn excision. A commonly reported approach involves coagulation and transection of the round ligament at the uterine cornu, followed by opening of the broad ligament to gain access to the retroperitoneal space. This permits direct visualization of the ureter and uterine artery, facilitating safe vascular control. The uterine artery

is then coagulated and divided near its insertion into the uterus. Subsequently, a hysteroscope is advanced to the uterine fundus and the light intensity increased to allow transmyometrial visualization from the laparoscopic field. Once the plane of separation is clearly identified, the rudimentary horn is excised while preserving an adequate amount of healthy myometrium. When necessary, the residual uterine defect is reconstructed using a double-layer closure with delayed-absorbable barbed sutures. Salpingectomy is then performed.[19]

In the present series, a modified surgical sequence was utilized. Ipsilateral salpingectomy was performed first, followed by transection of the utero-ovarian and round ligaments. Retroperitoneal dissection was undertaken to identify and protect the ureter. The rudimentary horn was then carefully separated from the unicornuate uterus under the guidance of hysteroscopic transillumination, allowing accurate delineation of the dissection plane. Chromotubation may also be employed following excision to assess the integrity of the remaining uterine wall. If a myometrial defect is identified, multilayer closure using principles similar to those employed in laparoscopic myomectomy is recommended.[16]

Complications from inadequate resection may occur as late as 6 years from the initial surgery.[14] There is paucity of data on the rates of adhesions post-laparoscopic uterine horn resection; however, the data from laparoscopic myomectomies have shown lower rates of adhesion formation for laparoscopic techniques that open myomectomies. Patients with non-communicating uterine horns that contain functional endometrium are at increased risk of ectopic pregnancy, hematosalpinx, endometriosis and endometrioma secondary to retrograde menstruation. In these patients' removal of the rudimentary horn with the ipsilateral fallopian tube is warranted. Rudimentary horn pregnancy occurs in 1 in 76,000 pregnancies.[17] The explanation of the pregnancy mechanism provided in the literature is the intraperitoneal transmigration of sperm or fertilized ova to the noncommunicating uterine horn. This phenomenon prompted the recommendation of removing the ipsilateral fallopian tube of the rudimentary horn.

Conclusion

The patients in this case series shared several common features, including diagnosis during infertility evaluation in their third decade of life and the presence of a unicornuate uterus with a non-communicating rudimentary horn. Notably, two of the three patients were asymptomatic at presentation, highlighting that this anomaly may remain undetected until fertility assessment is undertaken.

These cases underscore the importance of maintaining a high index of suspicion for Müllerian anomalies in women undergoing infertility evaluation, particularly when imaging findings are atypical or inconclusive. Accurate preoperative characterization of uterine anatomy is critical for appropriate counseling, fertility planning, and surgical management. While MRI remains the reference standard for evaluating rudimentary horns and assessing functional endometrium and myometrial continuity, advances in three-dimensional ultrasonography offer a highly accurate and more accessible diagnostic alternative. In situations where MRI is unavailable, hysteroscopic transillumination may serve as a valuable adjunct for defining anatomical relationships and guiding safe laparoscopic dissection.

The management of a non-communicating rudimentary horn should be individualized according to the patient's symptoms, reproductive goals, and anatomical findings. Successful surgical treatment requires meticulous preoperative planning, careful assessment of associated urinary tract anomalies, and a thorough understanding of the considerable anatomical variability of this condition. Although fertility can be achieved following appropriate management, patients should be counseled regarding the increased risks of miscarriage, ectopic pregnancy, preterm birth, and other adverse obstetric outcomes associated with a unicornuate uterus. Early recognition and timely intervention may help optimize both reproductive and pregnancy outcomes in this unique patient population.

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