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Case report of Herlyn–Werner–Wunderlich syndrome in 2-year-old child with completely obstructed hemivagina with pyocolpos

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Herlyn–Werner–Wunderlich syndrome (HWWS) is a rare congenital anomaly of the development of the female genital organs, characterized by a triad of symptoms: a double uterus, obstructed hemivagina, and ipsilateral renal agenesis. This complex and combined malformation of the genitourinary system is difficult to diagnose, especially in young children.

Aim – analyze and describe the experience of diagnosing and treating a 2-year-old girl with left renal agenesis, a double uterus, and incomplete obstructive pyocolpos, based on a clinical case.

Clinical case. Ultrasound (US) examination revealed the absence of the left kidney, a left ovarian cyst, and an enlarged uterus. Computed tomography (CT) diagnosed a tumor formation of the pelvis and agenesis of the left kidney. During the diagnostic laparoscopy (DL), a doubled uterine body and a tumor formation were found. Additional magnetic resonance imaging (MRI) allowed the diagnosis of HWWS. Vaginoscopy, septotomy with pyocolpos drainage, and complete excision of the vaginal septum were performed. Two cervical ossifications were visualized. HWWS manifests after the onset of menarche, when the obstructed hemivagina fills with menstrual blood. Ultrasound and MRI, supplemented by laparoscopy, are the gold standard for diagnosing this pathology. In our case, ultrasound and CT data did not provide a clear picture. However, DL and MRI confirmed the diagnosis.

Conclusion. Thus, a multidisciplinary and multi-instrumental approach with minimally invasive technologies allowed us to diagnose a rare congenital anomaly of the genitourinary system and quickly eliminate the obstruction of the left hemivagina without adverse gynecological and reproductive consequences.

The study was conducted in accordance with the principles of the Declaration of Helsinki. Informed consent was obtained from the child's parents participating in the study.

The authors declare no conflicts of interest.

Keywords: Herlyn–Werner–Wunderlich syndrome, OHVIRA syndrome, uterine didelphys, obstructed hemivagina, renal agenesis, pediatric gynecology

Клінічний випадок синдрому Херліна–Вернера–Вундерліха у 2-річної дитини з повною обструкцією гемівagini та піокольпосом

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Синдром Херліна–Вернера–Вундерліха (СХВВ) – рідкісна вроджена аномалія розвитку жіночих статевих органів, що характеризується тріадою симптомів: подвоєння матки, обструктивною гемівагіною та агенезією іпсилатеральної нирки. Таку складну та комбіновану ваду розвитку сечостатевої системи важко діагностувати, особливо в дітей раннього віку.

Мета – проаналізувати та описати досвід діагностики та лікування 2-річної дівчинки з агенезією лівої нирки, подвоєною маткою та неповним обструктивним піокольпосом на підставі клінічного випадку.

Клінічний випадок. У дівчинки під час ультразвукових досліджень (УЗД) виявлено відсутність лівої нирки, кісту лівого яєчника та збільшення матки. На комп'ютерній томографії (КТ) діагностували пухлиноподібне утворення малого тазу та агенезію лівої нирки. Під час діагностичної лапароскопії візуалізоване подвоєне тіло матки, а також пухлиноподібне утворення. Додаткова магнітно-резонансна томографія (МРТ) дала змогу діагностувати СХВВ. Проведено вагіноскопію, септотомію з розкриттям піокольпосу та висічення перетинки в повному обсязі. Візуалізовано два вічки шийки матки. СХВВ проявляється після початку менархе, коли обструктивна гемівлагіна заповнюється менструальною кров'ю. УЗД та МРТ, доповнені лапароскопією, є золотим стандартом діагностики цієї патології. У нашому випадку дані УЗД та КТ не дали чіткої картини. Проте діагностична лапароскопія та МРТ підтвердили діагноз.

Висновок. Мультидисциплінарний та мультиінструментальний підхід із мініінвазивними технологіями дали змогу діагностувати рідкісну вроджену ваду сечостатевої системи та швидко усунути обструкцію лівої гемівлагіни без несприятливих гінекологічних та репродуктивних наслідків.

Дослідження виконано відповідно до принципів Гельсінської декларації. На проведення досліджень отримано інформовану згоду батьків дитини.

Автори заявляють про відсутність конфлікту інтересів.

Ключові слова: синдром Херліна–Вернера–Вундерліха, синдром OHVIRA, подвоєння матки, обструктивна гемівлагіна, агенезію нирки, дитяча гінекологія.

Introduction

Knowledge about congenital malformation of the female genital tract is extremely important, as they have a major impact on fertility and quality of life [2]. The prevalence of congenital uterine anomalies is 7% to 10% in the general female population [1]. However, there are extremely complex malformations of the genitourinary system that are difficult to diagnose, often go unnoticed, are incorrectly and late diagnosed, and as a result do not receive timely treatment [2]. One of these pathologies is Herlyn–Werner–Wunderlich syndrome (HWWS), a rare congenital developmental anomaly characterized by a triad of symptoms: uterus didelphys with obstructive hemivagina and agenesis of the ipsilateral kidney. This anomaly was first described in 1971 by Herlyn and Werner as renal agenesis and ipsilateral blind hemivagina [12] and in 1976 supplemented by Wunderlich, who described the association of renal aplasia with a bicornuate uterus and the presence of an isolated hematocervix [28]. This syndrome is also known by the acronym OHVIRA – obstructed hemivagina and ipsilateral renal anomaly, which was introduced by N. Smith and M. Laufer in 2007 [18]. The etiology of HWWS is currently not fully understood, but it is believed to be caused by abnormal development of the Müllerian and Wolffian ducts at 8 weeks of gestation. The incidence of this disease in the general population varies from 0.1% to 3.8% [2,3,31].

As a rule, HWWS is extremely difficult to diagnose; in most cases, this syndrome is detected in the postpubertal period with the onset of menarche, which is manifested by the progressive filling of the hemivagina with menstrual blood and delayed menstruation. The main symptoms of HWWS can be progressive cyclic pelvic pain, fever, urinary tract infection, mucopurulent vaginal discharge, and the presence of a tumor formation in the pelvis [9,11,14,23].

Consequently, timely diagnosis and early treatment of HWWS is the key to avoiding reduced fertility and the development of dangerous complications.

The aim of our work is to analyze and describe the experience of diagnosing and treating a 2-year-old girl with left renal agenesis, a double uterus, and incomplete obstructive pyocolpos, based on a clinical case.

The research was carried out in accordance with the principles of the Declaration of Helsinki. The informed consent of the patient was obtained for conducting the studies.

Clinical case

2-year-old girl T., whose clinical history began at the age of one year when the left kidney was not found during ultrasound (US) of the abdominal cavity and retroperitoneal space. After 6 months, the control US confirmed the absence of the left kidney and revealed a cyst of the left ovary. At the age of 2 years, the third US was performed: the absence of the left kidney was diagnosed, and an increase in the size of the uterus was visualized, without a cyst of the left ovary. The child developed according to physiological norms. She was treated once in the central district hospital for acute right-sided pyelonephritis. The district pediatrician referred the child to the Limited Liability Company Medical Curatively–Diagnostic Center «MEDION» for examination in the form of a computed tomography (CT) with contrast to confirm the diagnosis of the absence of the left kidney.

After examination, the child was hospitalized in the surgical department with a preliminary diagnosis: tumor formation in the pelvis, single right kidney, and pyocolpos (Fig. 1). Examined by a pediatric surgeon: no complaints at the time of examination. Objectively: the abdomen is symmetrical, not distended, participates in the act of breathing, soft, painless, accessible to deep palpa-

Clinical case



Fig. 1. CT scan of the abdominal cavity. The red arrow indicates an unverified tumor mass; the yellow arrow indicates the right kidney; the blue arrow and oval indicate a possible vaginal cavity

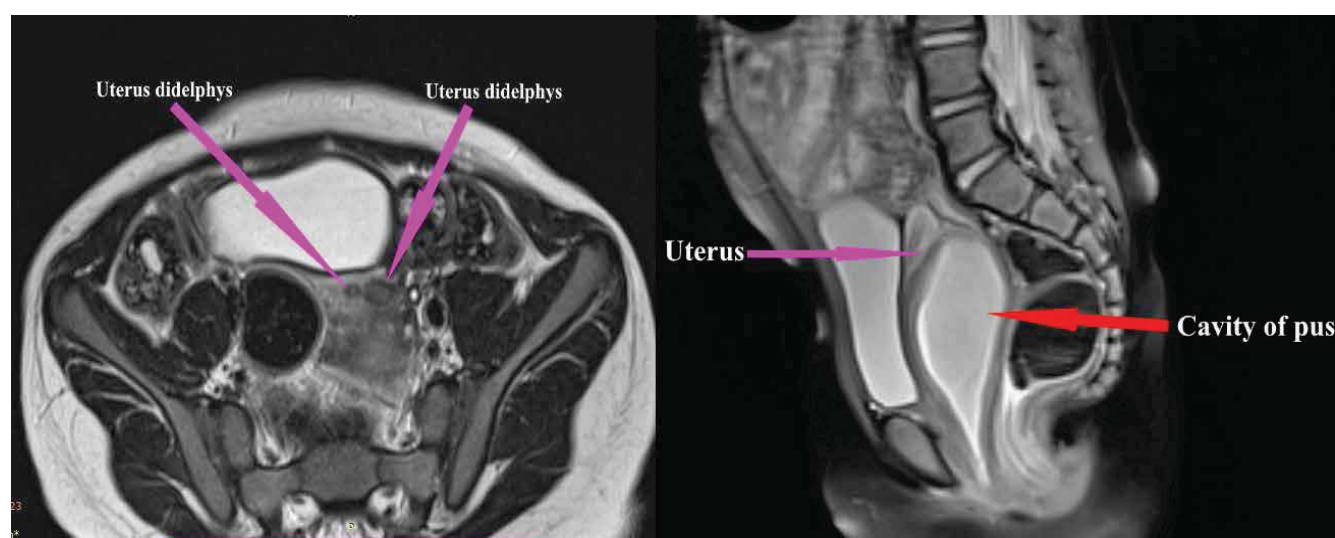


Fig. 2. MRI of the abdominal cavity. The purple arrow indicates a double uterus; the red arrow indicates a cavity with pus

tion, tumor formations are not palpable, and peritoneal symptoms are negative. Rectal examination: the entrance is free, painless, the sphincter is normotensive, the ampulla is empty, there is an overhang of the anterior wall of the rectum, palpation at a finger height of up to 8 cm, and a rounded, voluminous formation of soft-elastic consistency is palpated. During bimanual rectal examination, a mass is palpated, and when pressed, a white-gray discharge with an unpleasant putrid odor appears from the vagina. Clinical blood test and urine test: no pathological changes.

In order to clarify the diagnosis, the child underwent magnetic resonance imaging (MRI) of the pelvic organs: a single right kidney; a teardrop-shaped mass is visualized in the pelvis, with a wide base to the top, adjacent to the posterior vaginal wall, measuring $6.3 \times 4.4 \times 2.7$ cm, with a wall thickness of up to 0.4 cm, and protein content. The uterus is displaced upward by this mass, mea-

suring $1.4 \times 1.1 \times 0.8$ cm. Two cavities in the uterus cannot be excluded (Fig. 2).

This case was discussed in the department with the involvement of a pediatric gynecologist, urologist, and pediatric surgeon. Given the presence of a single kidney and a tumor formation in the pelvis, and inconclusive data on uterine doubling on MRI, it was assumed that there was a congenital anomaly of the genitourinary system. It was decided to take the child to the operating room for diagnostic laparoscopy (DL) and vaginoscopy.

During DL, a large tumor mass was located in the pelvic cavity. A bicornuate uterus is visualized above the mass; ovaries of normal size without pathological changes. The Douglas space is free. During vaginoscopy, a protrusion of the vaginal wall is visualized (Fig. 3).

The data obtained after DL – a tumor-like formation of the pelvis with a doubled uterus above it, combined with a single kidney – allowed the consultation consist-

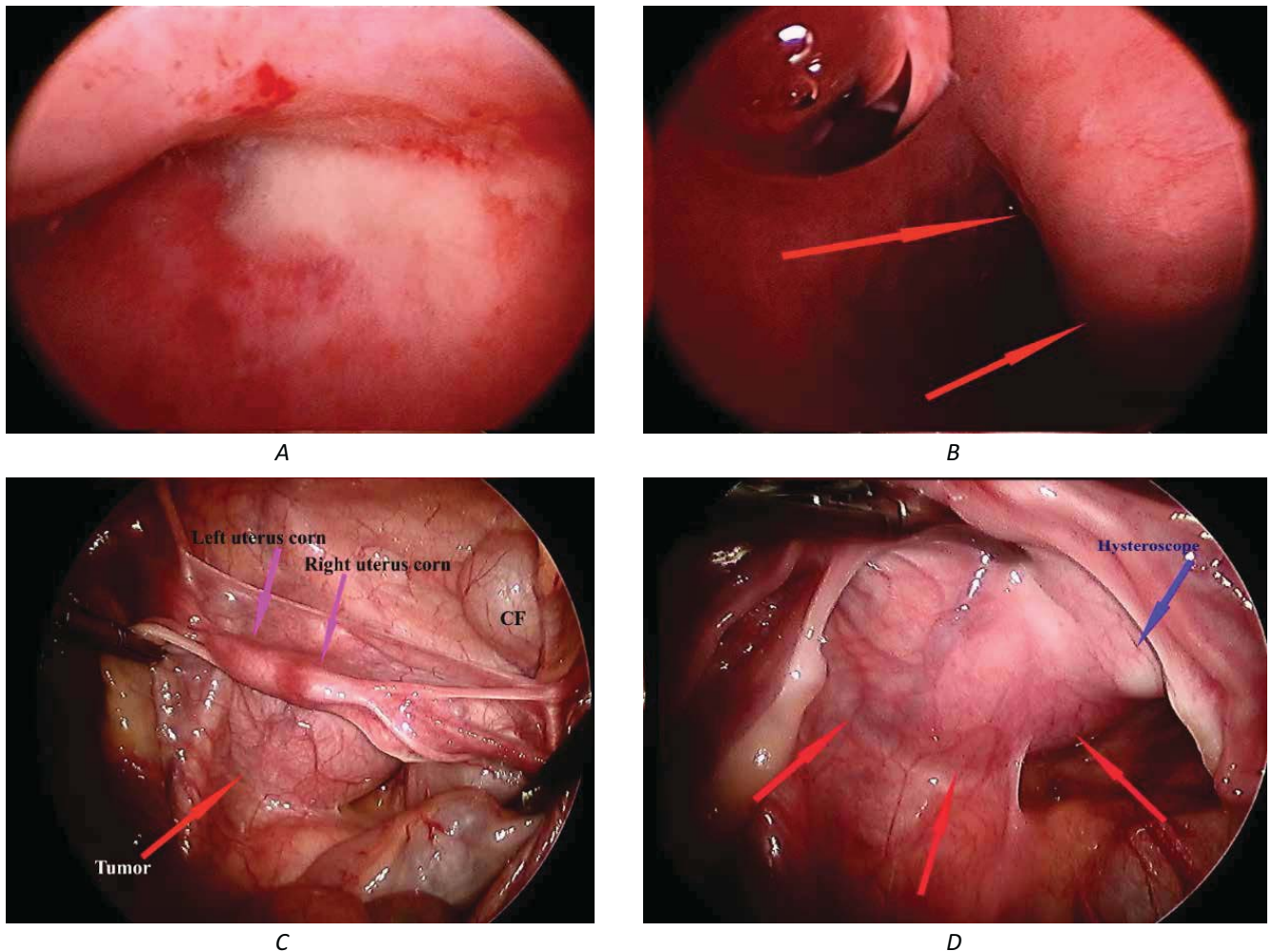


Fig. 3. A, B – Vaginoscopy with fibrinous lay-up on the vaginal wall: the red arrow indicates the protrusion of the vaginal wall on the left side. C, D – Diagnostic laparoscopy: CF – Foley catheter in the bladder; the purple arrow indicates the doubled uterus; the red arrow indicates the tumor-like protrusion; the blue arrow indicates the hysteroscope in the vaginal cavity

ing of a pediatric surgeon, pediatric gynecologist, and urologist to formulate a preliminary diagnosis: HWWS.

The child underwent vaginoscopy, septotomy using a hystero-resectoscope with opening of the pyocolposus, and purulent discharge up to 100 ml was obtained. The membrane was totally excised, hemostasis was achieved, and the cavity was washed with 0.05% Chlorhexidine. Two cervical os are visualized in this cavity – one on the left, and another cervical os on the right side (Fig. 4).

The child was discharged from the department on the same day in satisfactory condition with subsequent outpatient antibacterial and anti-inflammatory therapy for up to 5 days. Blood control after 14 days and US control after 30 days – without pathological changes. Observation and control of the patient for 5 years – without pathology.

Discussion

HWWS is an extremely rare condition; in China, with a population of 1.4 billion, only 37 cases of this disease

were detected during 20 years of observation by M. Liu et al. [15]. However, according to L. Zhu et al., in the hospital of Beijing United Medical College, 2238 cases of congenital malformations of the female genital organs were identified over 27 years, of which 79 patients had HWWS [31].

As a rule, in early childhood, this syndrome is asymptomatic; normally developed external genitalia and the absence of protrusion of the hemi-vaginal wall mask this pathology. Some authors describe HWWS with a clinical picture of vaginal protrusion in newborn girls, and associate it with maternal estrogen [13,27].

The average age of patients according to L. Zhu et al. with complete obstructive hemivagina was 13.0 ± 2.05 years and 25.74 ± 7.73 years with incomplete obstruction. In this observation, only 11 clinical cases of newborns (up to 1 month) with HWWS and 3 patients up to 5 years of age were described. All newborns were prenatally diagnosed with renal agenesis, and HWWS

Clinical case

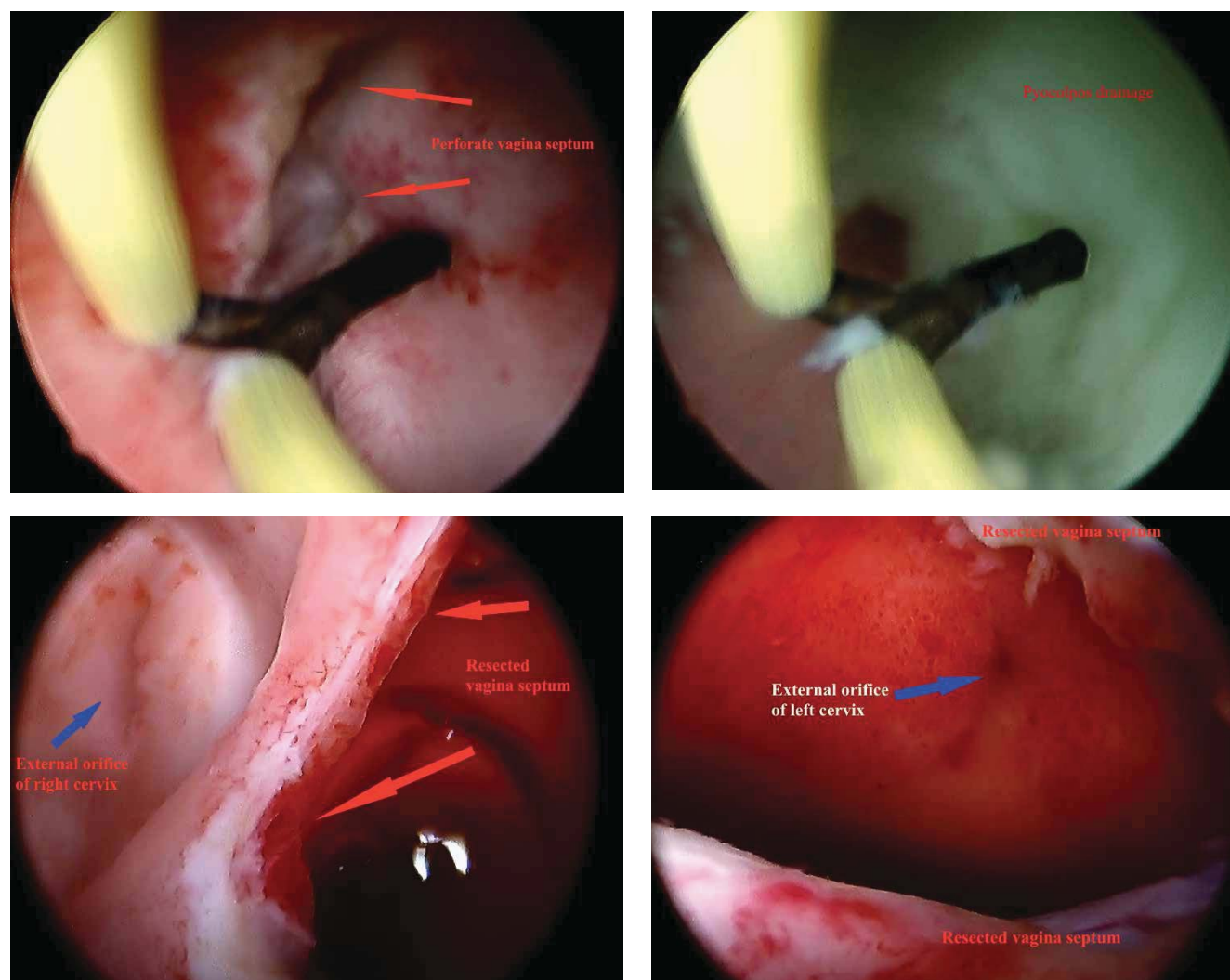


Fig. 4. Vaginostopy. Excision of the vaginal septum and drainage of the pyocolpos. The blue arrow indicates the external os of the right and left double uterus, respectively; the red arrow indicates the vaginal septum

was diagnosed after birth [31]. According to various authors, HWWS is more common on the right side [7,15]; in our case, left-sided pathology was diagnosed.

In most cases, HWWS manifests itself after the onset of menarche due to the overflow of the obstructed hemivagina with menstrual blood. The leading symptoms are dysmenorrhea and pulling pains in the lower abdomen, which increase after each menstruation. Also, this pathology is characterized by the formation of an adhesion process in the pelvic cavity, obstruction and recurrent urinary tract infections, the possibility of pelvic abscess formation, pyo-hematocolpos, pyosalpinx, the development of peritonitis, and endometriosis, which can lead to infertility [16,17].

According to the work of P. Acien et al., who, together with a team of authors, reviewed and supplemented the embryological-clinical classification of congenital malformations of the female genital organs, which has 6 classes, HWWS syndrome belongs to class 2 of Meso-

nephric or Wolffian anomalies, namely to subclass 2.1. This subclass includes cases with uterus didelphys or a bicornuate uterus without communicating uteri but with a blind or imperforated hemivagina, with hydrocolpos or large haematocolpos and ipsilateral renal agenesis [2].

Based on the classification proposed by L. Zhu et al. HWWS syndrome can be divided into 2 types [31], with complete and partial obstruction of the hemivagina, and 2 subtypes can be distinguished in each (Fig. 5). Type 1.1 with blind hemivagina – in this classification, the hemivagina is completely obstructed, the uterus behind the septum is completely isolated from the contralateral uterus, and no communication is present between the duplicated uterus and vagina. Hematocolpos may occur only a few months after menarche, also can occur hemo-peritoneum, endometriosis, and very rarely pyocolpos – which was the reason for the diagnosis of our clinical case (Fig. 5A).

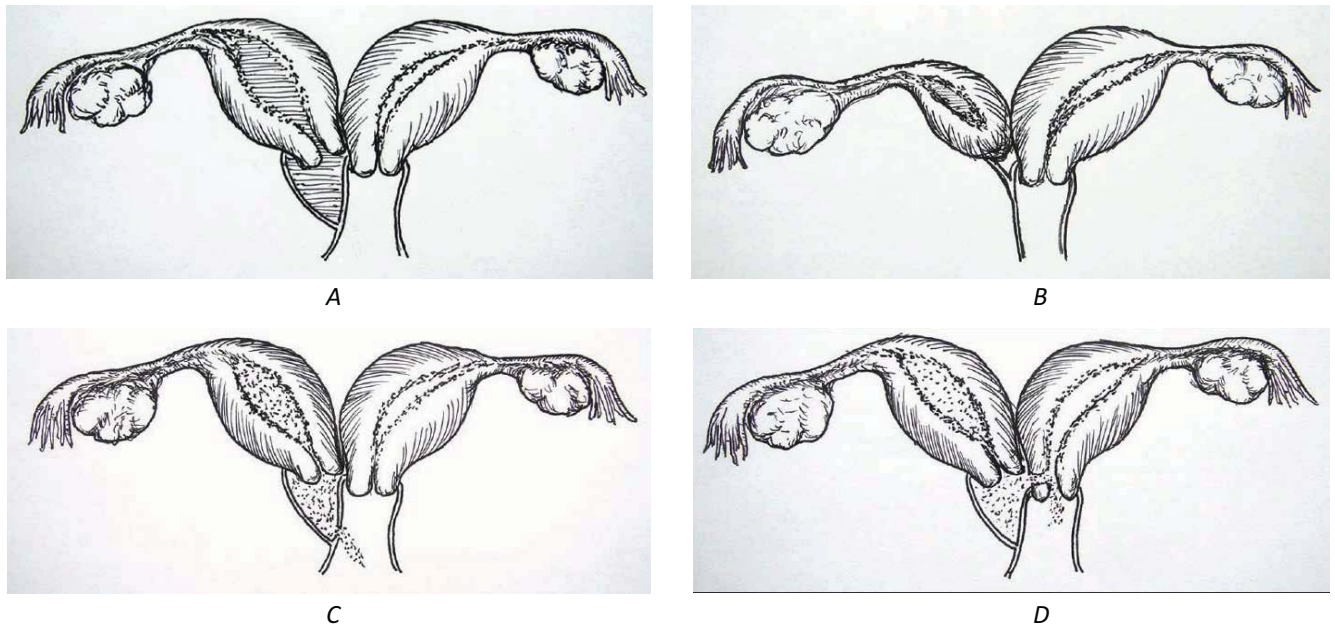


Fig. 5. Classification of HWWS by types, according to L. Zhu et al. 2015 [31]. A – completely obstructed hemivagina (blind hemivagina). B – completely obstructed hemivagina – cervicovaginal atresia, without communicating uteri. C – incompletely obstructed hemivagina – partial reabsorption of the vaginal septum. D – incompletely obstructed hemivagina with communicating uteri

Type 1.2, cervicovaginal atresia without communicating uteri – in this classification, the hemivagina is completely obstructed; the cervix behind the septum is maldeveloped or atresic, and menses from the uterus behind the septum cannot outflow through the atresic cervix. Patients with this classification have similar clinical features as patients with Classification 1.1 (Fig. 5B).

Classification 2.1, partial reabsorption of the vaginal septum – in this classification, a small communication exists between the two vaginas, which makes the vaginal cavity behind the septum incompletely obstructed. The uterus behind the septum is completely isolated from the contralateral uterus. The menses can outflow through the small communication, but the drainage is impeded. These patients have a later age of onset. The attack often comes years after menarche. Patients often have ascending genital system infection (Fig. 5C). Classification 2.2 with communicating uteri – in this classification, the hemivagina is completely obstructed, and a small communication exists between the duplicated cervixes. Menses from the uterus behind the septum can outflow through the communication to the offside contralateral cervix. Because the communication is small, the drainage is still impeded (Fig. 5D) [31]. According to this classification, the clinical case presented by us belongs to type 1.1.

In 2020, J. Zhang et al., based on the experience of treating 26 patients, proposed to supplement the classification with 30 type (obstruction, ureteric orifice, outcome) with the presence of various types of vaginal ob-

struction with paravaginal cysts and ureteral ectopia in the hemivagina at different levels [30]. The classification is also supplemented with cases of contralateral urological anomaly: vesicoureteral reflux, megaureter, ureterocele, and dysplastic kidney [11,15].

Timely surgical correction of this anomaly should be aimed at preventing gynecological complications – endometriosis, which occurs in 17–35% of women with uterine duplication and about 23% of patients with HWWS, inflammatory diseases of the appendages, and preservation of fertility [5]. Literature data indicate that early decompression of the hemivagina prevents the development of endometriosis, and from the genitourinary system, it avoids the risks of developing hypertension, proteinuria, and chronic kidney disease [10,26].

Ultrasound is the first and simplest instrumental method, which is the gold standard for diagnosing this pathology [8,22]. In turn, DL is the reference standard as a simple, minimally invasive, low-traumatic, accessible and rapid method of diagnosing this pathology, and is recommended for clarifying the diagnosis as well as in cases of endometriosis, pelvic adhesions, and pelvic abscess. Some authors recommend DL when MRI and US data are not clear and uninformative [8,25]. Other clinicians suggest MRI as the primary method, and additionally hysterosalpingography, which in combination with US and DL allows for a precise diagnosis [11,14,19,29].

In our case, performing CT with contrast to confirm the diagnosis of the absence of the left kidney at the pre-hospital stage should be considered unnecessary, since

Clinical case

CT carries a radiation load and is inferior in diagnostic value to MRI in this category of patients. Thus, the US and CT did not give a clear picture, but only confirmed the absence of the left kidney. The presence of a pelvic mass prompted us to perform a DL, which made it possible to detect uterine doubling. MRI did not provide clear visualization of the doubling due to the patient's young age and the small size of the uterus. However, MRI in our case confirmed the diagnosis of HWWS, allowed us to assess the topography of the pelvic organs and determine the final technique of surgical correction. Consequently, the ideal sequence in the diagnosis and treatment of this syndrome would be a combination of MRI with subsequent vaginoscopic septotomy.

Some authors describe prenatal diagnosis of HWWS, which is manifested by renal agenesis and the presence of a tumor-like formation behind the bladder, but in some cases, both kidneys are detected prenatally on US, and after birth, the absence of one kidney is diagnosed, which is confirmed on MRI [13,23].

Differential diagnosis of HWWS should be carried out with other variants of genital tract obstruction, leading to the occurrence of hydrometrocolpos, as well as with volumetric formations of the abdominal cavity and small pelvis. Such pathologies include imperforate hymen, transverse vaginal septum, vaginal atresia, which may be combined with urogenital sinus or cloaca, ovarian cysts and other neoplasms of both congenital, inflammatory and malignant etiology. Hydrometrocolpos can also be combined with such hereditary diseases as McKusick–Kaufman Syndrome and Bardet–Biedl Syndrome. These syndromes are extremely rare autosomal recessive anomalies that include hydrometrocolpos, postaxial polydactyly, retinal dystrophy or retinitis pigmentosa, obesity, nephropathy, mental retardation, and congenital heart defects. In hereditary variants of hydrometrocolpos, the causes of obstruction are the transverse vaginal septum and its atresia [6,21].

The main goal of treatment for HWWS is to create a connection between the right and left halves of the vagina. The most optimal treatment method is hysteroscopic septotomy with removal of as much of the septum as possible and drainage of the hematocolpos or pyocolpos, which can be performed either by open – direct surgical excision or using a resectoscope. Hysteroscopic treatment is a reliable and safe treatment method; some authors recommend performing it without general anesthesia in an outpatient setting [9,24]. In-office Hysteroscopic treatment can only be used for adult patients; in our case, the child required general anesthesia and a half-day hospital stay under observation. Laparoscopic treatment is only indicated in the presence of complica-

tions such as endometriosis, pelvic abscess, peritonitis, and hemoperitoneum [22].

Successful and early treatment of HWWS gives an excellent percentage of fertility [20], so according to G. Candiani et al., the fertility rate reaches 87% [4]. According to the study by Tong J et al., out of 33 women who wanted to have children, 28 became pregnant and gave birth to 58 children, which reaches 84.8% [22].

Conclusion

Thus, a multidisciplinary and multi-instrumental approach with minimally invasive technologies allowed a 2-year-old girl to be diagnosed with a rare congenital defect of the genitourinary system and to endoscopically eliminate the obstruction of the left hemivagina without complications and adverse gynecological, urological, or reproductive consequences.

No conflict of interests was declared by the authors.

References/Література

1. Acien P, Acien M, Sánchez-Ferrer M. (2004). Complex malformations of the female genital tract. New types and revision of classification. Hum Reprod. 19(10): 2377-2384. doi: 10.1093/humrep/deh423.
2. Acien P, Navarro V, Acien M. (2024). Embryological-clinical classification of female genital tract malformations – a review and update. Reprod Biomed Online. 51(1): 104751. doi: 10.1016/j.rbmo.2024.104751.
3. Bortoletto P, Romanski PA, Pfeifer SM. (2024). Müllerian Anomalies: Presentation, Diagnosis, and Counseling. Obstet Gynecol. 143(3): 369-377. doi: 10.1097/aog.0000000000005469.
4. Candiani GB, Fedele L, Candiani M. (1997). Double uterus, blind hemivagina, and ipsilateral renal agenesis: 36 cases and long-term follow-up. Obstet Gynecol. 90(1): 26-32. doi: 10.1016/s0029-7844(97)83836-7.
5. Cappello S, Piccolo E, Cucinelli F, Casadei L, Piccione E, Salerno MG. (2018). Successful preterm pregnancy in a rare variation of Herlyn–Werner–Wunderlich syndrome: a case report. BMC Pregnancy and Childbirth. 18(1): 498. doi: 10.1186/s12884-018-2133-2.
6. Chiang AP, Beck JS, Yen HJ, Tayeh MK, Scheetz TE, Swiderski RE et al. (2006). Homozygosity mapping with SNP arrays identifies TRIM32, an E3 ubiquitin ligase, as a Bardet–Biedl syndrome gene (BBS11). Proc Natl Acad Sci U S A. 103(16): 6287-6292. doi: 10.1073/pnas.0600158103.
7. Coskun A, Okur N, Ozdemir O, Kiran G, Arýkan DC. (2008). Uterus didelphys with an obstructed unilateral vagina by a transverse vaginal septum associated with ipsilateral renal agenesis, duplication of inferior vena cava, high-riding aortic bifurcation, and intestinal malrotation: a case report. Fertil Steril. 90(5): 2006. e2009-2011. doi: 10.1016/j.fertnstert.2008.05.030.
8. Del Vescovo R, Battisti S, Di Paola V, Piccolo CL, Cazzato RL, Sansoni I et al. (2012). Herlyn–Werner–Wunderlich syndrome: MRI findings, radiological guide (two cases and literature review), and differential diagnosis. BMC Med Imaging. 12: 4. doi: 10.1186/1471-2342-12-4.
9. Fascilla FD, Olivieri C, Cannone R, De Palma D, Manosperta F, Costantino AS et al. (2020). In-office Hysteroscopic Treatment of Herlyn–Werner–Wunderlich Syndrome: A Case Series. J Minim Invasive Gynecol. 27(7): 1640-1645. doi: 10.1016/j.jmig.2020.04.013.

10. Gholoum S, Puligandla PS, Hui T, Su W, Quiros E, Laberge JM. (2006). Management and outcome of patients with combined vaginal septum, bifid uterus, and ipsilateral renal agenesis (Herlyn–Werner–Wunderlich syndrome). *J Pediatr Surg*. 41(5): 987–992. doi: 10.1016/j.jpedsurg.2006.01.021.
11. Han JH, Lee YS, Im YJ, Kim SW, Lee M-J, Han SW. (2016). Clinical Implications of Obstructed Hemivagina and Ipsilateral Renal Anomaly (OHVIRA) Syndrome in the Prepubertal Age Group. *PLoS One*. 11(11): e0166776. doi: 10.1371/journal.pone.0166776.
12. Herlyn U, Werner H. (1971). Simultaneous occurrence of an open Gartner-duct cyst, a homolateral aplasia of the kidney and a double uterus as a typical syndrome of abnormalities. *Geburtshilfe Frauenheilkd*. 31(4): 340–347.
13. Kueppers J, Wehrli L, Zundel S, Shavit S, Stahr N, Szavay PO. (2021). OHVIRA-syndrome in a newborn. *Journal of Pediatric Surgery Case Reports*. 69: 101859. <https://doi.org/10.1016/j.epsc.2021.101859>.
14. Lee J. (2018). Herlyn–Werner–Wunderlich Syndrome: A Mini-review. *Childhood Kidney Diseases*. 22: 12–16. doi: 10.3339/jk-sp.2018.22.1.12.
15. Liu M, Zhang L, Xia Y, Huang X, Ye T, Zhang Y et al. (2021). New Consideration of Herlyn–Werner–Wunderlich Syndrome Diagnosed by Ultrasound. *J Ultrasound Med*. 40(9): 1893–1900. doi: 10.1002/jum.15572.
16. Orazi C, Lucchetti MC, Schingo PM, Marchetti P, Ferro F. (2007). Herlyn–Werner–Wunderlich syndrome: uterus didelphys, blind hemivagina and ipsilateral renal agenesis. Sonographic and MR findings in 11 cases. *Pediatr Radiol*. 37(7): 657–665. doi: 10.1007/s00247-007-0497-y.
17. Piccinini PS, Doski J. (2015). Herlyn–Werner–Wunderlich syndrome: a case report. *Rev Bras Ginecol Obstet*. 37(4): 192–196. doi: 10.1590/so100-720320150005077.
18. Smith NA, Laufer MR. (2007). Obstructed hemivagina and ipsilateral renal anomaly (OHVIRA) syndrome: management and follow-up. *Fertil Steril*. 87(4): 918–922. doi: 10.1016/j.fertnstert.2006.11.015.
19. Tangshewinsirikul C, Dulyaphat W, Diawtipsukon S, Tingthana-tikul Y, Satirapod C, Wattanasirichaigoon D. (2020). Successful pregnancy outcome in Herlyn–Werner–Wunderlich syndrome with pyocolpos: A case report and literature review. *Clin Case Rep*. 8(11): 2217–2222. doi: 10.1002/ccr3.3080.
20. Tan YG, Laksmi NK, Yap T-L, Sadhana N, Ong CCP. (2020). Preventing the O in OHVIRA (Obstructed Hemivagina Ipsilateral Renal Agenesis): Early Diagnosis and Management of Asymptomatic Herlyn–Werner–Wunderlich Syndrome. *J Pediatr Surg*. 55(7): 1377–1380. <https://doi.org/10.1016/j.jpedsurg.2019.06.006>.
21. Thorat JV, Tambolkar S. (2024). Persistent Urogenital Sinus Leading to Hydrometrocolpos in a Female Child With Features of McKusick-Kaufman Syndrome. *Cureus*. 16(6): e61957. doi: 10.7759/cureus.61957.
22. Tong J, Zhu L, Lang J. (2013). Clinical characteristics of 70 patients with Herlyn–Werner–Wunderlich syndrome. *Int J Gynecol Obstet*. 121(2): 173–175. doi: 10.1016/j.ijgo.2012.11.023.
23. Tuna T, Estevão-Costa J, Ramalho C, Fragoso AC. (2019). Herlyn–Werner–Wunderlich Syndrome: Report of a Prenatally Recognised Case and Review of the Literature. *Urology*. 125: 205–209. doi: 10.1016/j.urology.2018.12.022.
24. Veresnyuk N, Pyrohova V, Nakonechnyi A. (2020). Herlyn–Werner–Wunderlich syndrome – diagnostic-treatment approaches. *Neonatology, Surgery and Perinatal Medicine*. 10(3(37)): 53–58. doi: 10.24061/2413-4260.X.3.37.2020.8.
25. Wdowiarz K, Skrajna A, Reinholz-Jaskólska M. (2021). Diagnosis and treatment of Herlyn–Werner–Wunderlich syndrome: a case report. *Prz Menopauzalny*. 20(1): 52–56. doi: 10.5114/pm.2021.104034.
26. Westland R, Kurvers RA, van Wijk JA, Schreuder MF. (2013). Risk factors for renal injury in children with a solitary functioning kidney. *Pediatrics*. 131(2): e478–485. doi: 10.1542/peds.2012-2088.
27. Wunderlich M. (1976). Unusual form of genital malformation with aplasia of the right kidney. *Zentralbl Gynakol*. 98(9): 559–562.
28. Wu TH, Wu TT, Ng YY, Ng SC, Su PH, Chen JY et al. (2012). Herlyn–Werner–Wunderlich syndrome consisting of uterine didelphys, obstructed hemivagina and ipsilateral renal agenesis in a newborn. *Pediatr Neonatol*. 53(1): 68–71. doi: 10.1016/j.pedneo.2011.11.014.
29. Zhang J, Xu S, Yang L, Songhong Y. (2020). MRI image features and differential diagnoses of Herlyn–Werner–Wunderlich syndrome. *Gynecol Endocrinol*. 36(6): 484–488. doi: 10.1080/09513590.2019.1680623.
30. Zhang J, Zhang M, Zhang Y, Liu H, Yuan P, Peng X et al. (2020). Proposal of the 3O (Obstruction, Ureteric Orifice, and Outcome) Subclassification System Associated with Obstructed Hemivagina and Ipsilateral Renal Anomaly (OHVIRA). *J Pediatr Adolesc Gynecol*. 33(3): 307–313. doi: 10.1016/j.jpap.2020.01.001.
31. Zhu L, Chen N, Tong JL, Wang W, Zhang L, Lang JH. (2015). New classification of Herlyn–Werner–Wunderlich syndrome. *Chin Med J (Engl)*. 128(2): 222–225. doi: 10.4103/0366-6999.149208.

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