CASE REPORTS

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The Herlyn–Werner–Wunderlich triad (OHVIRA syndrome) with good pregnancy outcome – two cases and literature review

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Abstract

The Herlyn–Werner–Wunderlich syndrome (HWWS) is a complex congenital malformation, originally described as a triad of symptoms: didelphys uterus, low genital obstruction and unilateral renal anomaly. The term OHVIRA is an acronym (obstructed hemivagina/hemicervix with ipsilateral renal anomaly) and refers to the same syndrome. It gained acceptance in recent years, due to reports of cases having a non-didelphys uterus (normal, septated or having other abnormalities). In the following, we report two cases with good pregnancy outcome and we provide a short discussion on published literature. We highlight differences and complications in these two cases, confirming the extreme variability of anatomic structures involved in the syndrome. Though rare, the condition allows successful pregnancies. We describe the sixth case of didelphys uterus with unique (anatomically normal) vagina and unilateral isolated hemicervix hypoplasia/atresia. Imaging has a paramount importance in the diagnosis of HWWS/OHVIRA, with magnetic resonance (MR) usually superseding the ultrasound (US) method, and providing other viscera details. US, MR and laparoscopy/laparotomy complement each other, and for describing the anatomy of the obstruction a thorough clinical examination is required. The clinical course of the pathology is not standard and the management must be tailored, but term/near-term pregnancies resulting in healthy newborns are possible in HWWS. We advocate an appropriate maternal and fetal prenatal care and long-term follow-up.

Keywords: OHVIRA syndrome, Herlyn–Werner–Wunderlich syndrome, pregnancy, three-dimensional ultrasound, obstetrical outcome.

Introduction

Congenital malformations of the female genital system are defined as any deviations from normal anatomy. Their prevalence is not known and they have a huge number of variations, affecting all anatomic levels: the uterine corpus, the cervix and the vagina. Researchers have invested many efforts to classify them [1–4]. All these systems involve the subjective assessment of the observer. For many decades, uterine congenital anomalies have been associated in the published literature with unfavorable reproductive/neonatal outcome (infertility, recurrent pregnancy loss, malpresentations, preterm labor, *abruptio*) [5–7], and cervical incompetence [8]. Yet, there are authors reporting that these uterine malformations are pauci/asymptomatic [9–11].

Uterus didelphys is one of the rarest congenital abnormalities of the female reproductive system. The Herlyn–Werner–Wunderlich syndrome (HWWS) is a term describing a complex variant in this group: the triad didelphys uterus, low genital obstruction and unilateral renal anomaly. Since 2007 (other uterine anomalies, such as the septate uterus, being reported), the acronym referring on two features only (the obstructed hemivagina and ipsilateral renal anomaly – OHVIRA) gained a wide acceptance. During the fusion phase, the Müllerian ducts fuse in their distal portion in order to form the uterus, the cervix and the superior vagina. The abnormalities occurring in this period lead to uterine duplicity, renal agenesis, blind hemivagina. Uterus didelphys is the result of a severe fusion defect and it is characterized by two completely separated uterine cavities, one/two cervices and the presence of a complete/incomplete vaginal septum. This process evolves between gestation weeks 6 and 9 of embryogenesis [12, 13].

According to the *American Society for Reproductive Medicine* (ASRM) classification [1], uterus didelphys is a class III abnormality, with a frequency between 5% and 11% among all the Müllerian duct anomalies (MDAs). According to the Acién's classification, based on embryological and clinical criteria [4], this anomaly is included in group II (II1–II4): uterine duplicity with blind hemivagina (or atresia) and unilateral renal anomaly (URA). The newest *European Society of Human Reproduction and Embryology* (ESHRE)–*European Society for Gynaecological Endoscopy* (ESGE) classification [3] refers to this type as class U3 bicorporeal uterus, type U3b (complete bicorporeal uterus and longitudinal/transversal obstructing/non-obstructing vaginal septum). In this system, the specific class may be completed with cervix (C) and/or vagina (V) characterization.

Although years have gone by, newer classification systems did not quite gain the professional enthusiasm, and they did not replace the solid, traditional *American Fertility Society* (AFS)–ASRM classification.

In clinical practice, the accurate diagnosis of the specific variety of MDA is important, mainly for choosing the appropriate management in symptomatic cases and for counseling couples in regards to fertility and pregnancy

outcome. Currently, mixtures of invasive and non-invasive procedures are used. Ultrasound (US), especially three-dimensional (3D) transvaginal (TV) US, having the advantage of describing the coronal plane [14–16], hysterosalpingography (highlighting the internal contour only) and magnetic resonance imaging (MRI) are most often used. Many studies report that MRI is the best diagnostic method, having an accuracy of almost 100%, offering soft tissue details and being able to perform multiplanar image acquisitions [13, 17, 18]. By means of MRI, similar to the 3D US use, the operator is able also to assess simultaneously both uterine contours (internal and external), thus differentiating easier among different classes (didelphys/bicornuate/septate uterus).

All non-obstructive MDA cases, including major ones, may have a shallow clinical picture or no symptoms during pregnancy. Therefore, the diagnosis and complete description should be attempted before pregnancy.

To this date, the outcome of pregnancy in women with didelphys uterus is considered jeopardized. There are scarce reports on the association between OHVIRA and near term/term pregnancies.

In this article, we report two cases of OHVIRA syndrome, resulting in successful pregnancy evolutions and neonatal outcome, and we provide a short literature review.

Case presentations

In the below presented cases of HWWS, both patients obtained pregnancies spontaneously. In both cases, the external genitalia were normal.

Case No. 1

The first patient presented for the first visit on the prenatal care program at 18 weeks of amenorrhea (WA), having mild low abdomen and lumbar pain. She was a 16-year-old primipara, single parenting, having a low socio-economic status. She had been diagnosed two years prior the pregnancy with a congenital single left kidney and a didelphys uterus. The patient experienced menarche at 14 years, and complained of mild intermittent dysmenorrhea/algomenorrhea.

She presented with normal uterine tonus and no uterine contractions. The speculum examination revealed hyperemic vulva and vagina, and a small amount of festering vaginal discharge. The long and closed cervix was noted. The uterine height was consistent with 18 WA pregnancy. The US scan confirmed a normally developed fetus. The biological routine investigation was unremarkable, showing mild anemia.

For the MRI examination, 1.5 T GE MRI equipment was used, with the following sequences: sagittal T2-weighted, axial T2-weighted, axial T1-weighted fat suppression, coronal T2-weighted, coronal T1-weighted. The images acquired identified two completely separated hemiuteri, the pregnancy being present in the left one. Two separate cervical canals were also identified, the right one having an important fluid accumulation (Figure 1). Also, the images showed the two hemivagina with a fluid accumulation in the right one. The fluid appeared to have an intermediate signal on the T2-weighted images, aspect consistent with the festering secretion previously detected on clinical exam (Figure 2).

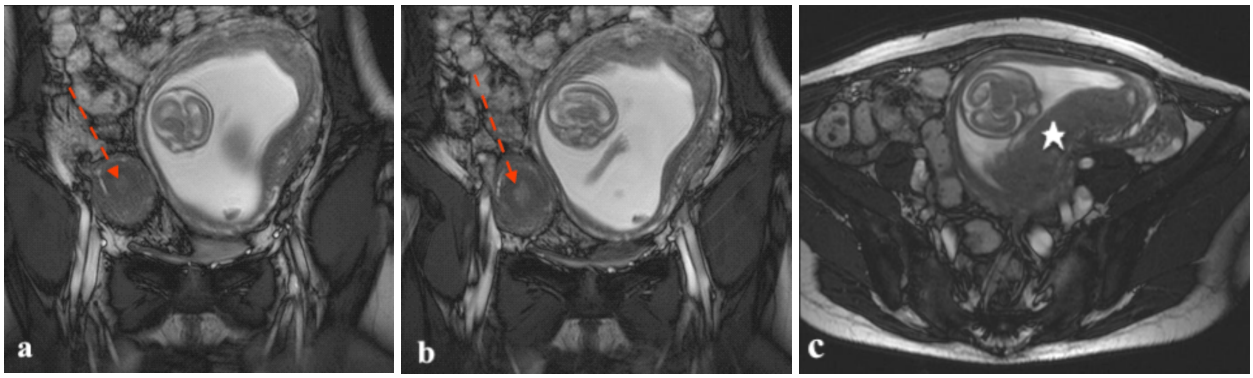

Figure 1 – ***Case No. 1, MRI: Coronal T2-weighted images showing the presence of two uterine bodies (red interrupted arrows show the right one), with the fetus present in the left one – fetal cranium (a), forearm and hand (b). In the axial T2-weighted images (c), the placenta can be noticed (white star). MRI: Magnetic resonance imaging.***

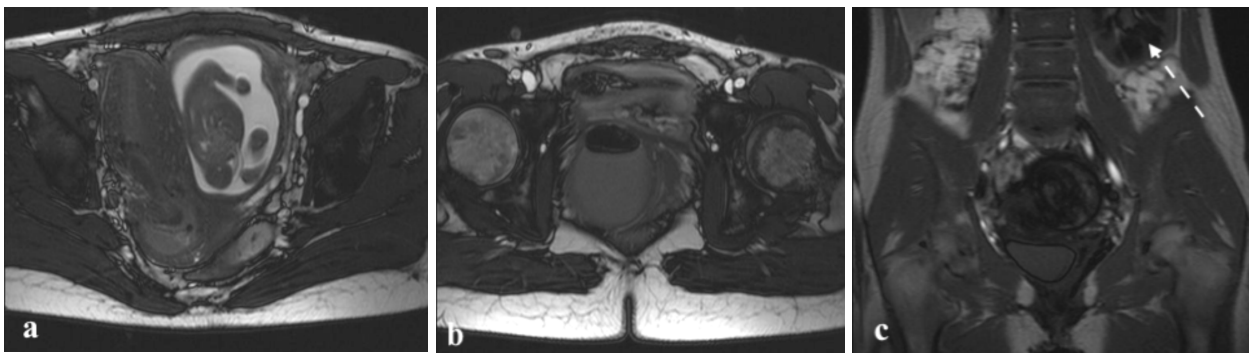

Figure 2 – ***Case No. 1, MRI: Axial T2-weighted images showing (a) the fluid accumulation in the right cervix and the presence of two completely separated cervical canals, the one on the left appearing to have a virtual cavity; in (b), the collection of fluid signal can be noticed in the right hemivagina; the lower pole of the left kidney seen on the coronal plane (c) (white interrupted arrow). MRI: Magnetic resonance imaging.***

Vaginal tissues were stretched and the obstructed right hemivagina contained large amounts of fluid. Due to pelvic inflammation and anatomical distortion in association with an evolving desired pregnancy, a two steps intervention was proposed. The first stage would have involved the drainage of old collected blood/pus, by opening the most protruding part. This would have led to the resolution of the main symptoms. The second-stage procedure would have involved septal resection and the marsupialization of the vagina (the so-called vaginoplasty or vaginal reconstruction). After the thorough clinical examination, the vaginal septum was punctured. The needle puncture extracted approximately 200 mL of pus-like fluid. The sample was used for bacteriologic cultures.

The presence of *Staphylococcus hemolyticus* was confirmed and treated according to sensitivity. The immature patient declined the proposed two-steps procedure and repeated punctures were performed. The pregnancy evolution was uneventful until 36 weeks, when the spontaneous rupture of the membranes occurred. An emergency Caesarean (C)-section was performed, for obstructed labor. The neonate was a healthy female, weighting 2700 g (Apgar score 8).

Case No. 2

The second case is a 37-year-old patient having a high education level. She also experienced the menarche at 14 years, and she had been completely asymptomatic until marriage (eight years prior to addressing our Unit). She self-presented for primary infertility.

The clinical exam revealed: normal vagina, and an enlarged cervix, suggesting two cervical canals: the right one having a normal opening and the left one being very small – pointy like (Figure 3).

The TV US exam diagnosed a didelphys uterus (with two complete separate hemicorpus), the left one corresponding to an obstructed left cervical canal, and containing blood-like fluid (Figure 4). On 3D TV US, the suspicion was bicornuate uterus and simple vagina in the presence of an isolated left hematocervix, the fluid collection suggesting menstrual blood retention (Figure 5). Also, the scan detected the congenital absence of the left kidney, and a completely normally structured and positioned right kidney.

The MRI exams confirmed the presence of two separate uterine bodies, two cervical canals, and the presence of fluid within the left cervix (Figures 6–8).

The patient evolved with a severe episode of pelvic inflammatory disease. The US scan was consistent with the clinical picture, with highly suggestive images for left pyosalpinx (Figure 9). Laparoscopic surgery was offered (Figure 10). The left pyosalpinx was confirmed and a unilateral salpingectomy was performed. No endometriosis implants were identified.

The postoperative evolution was uneventful. Repeated drainage of the left cervix by means of cervical dilation was performed. The patient presented with alternate hematocervix and pyocervix, as seen below (Figure 11). After eight drainage procedures, the patient spontaneously obtained the pregnancy, in the right corpus (Figure 12). The subsequently evolution was uneventful until term. An elective C-section was performed at 38 WA. The neonate was a healthy male, weighting 3100 g (Apgar score 9).

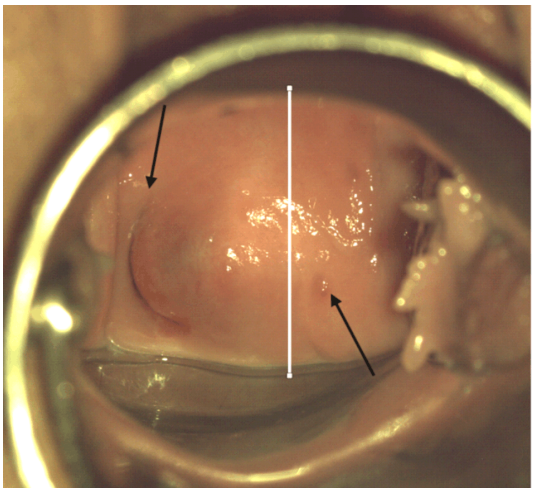

Figure 3 – ***Case No. 2. The clinical information on the speculum examination. Black arrows pointing the opening of the two cervical canals. The white line images the separation between the right and left cervix. The image demonstrates the hypoplastic cervical external os of the left cervix.***

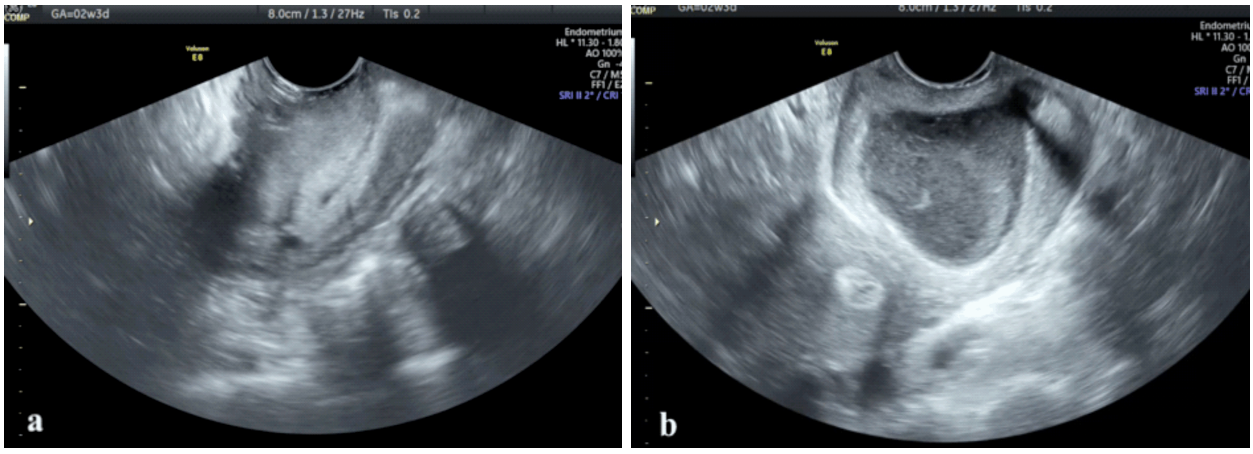

Figure 4 – ***Case No. 2. The 2D TV US information on sagittal planes: the right cervix (a) – normal virtual cavity; the left cervix (b) obstructed, having a real cavity, containing a fluid resembling blood. 2D TV US: Two-dimensional trans-vaginal ultrasound.***

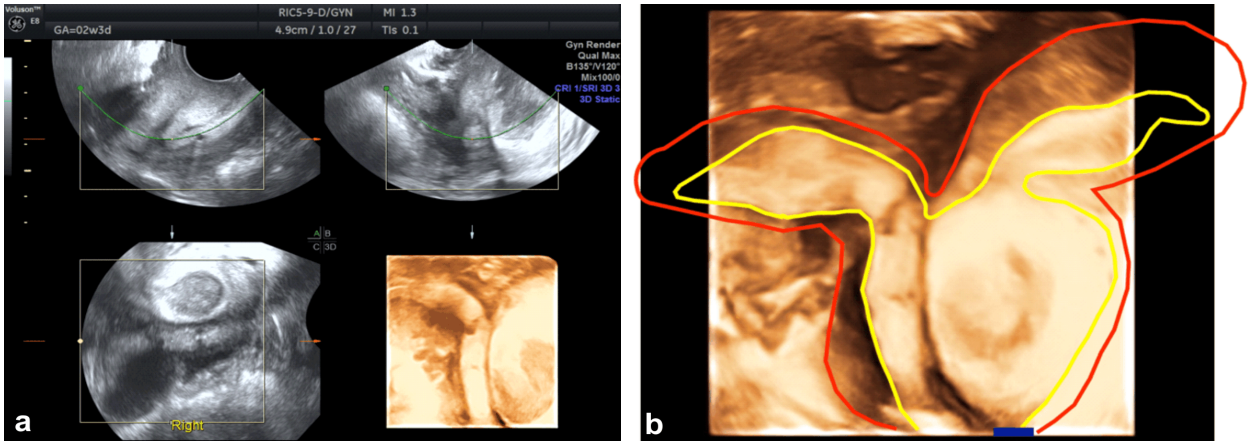

Figure 5 – *(a and b) Case No. 2, 3D TV US. The accumulation of menstrual blood is present only in the left cervical cavity (and not in the left corpus, nor in the vagina). The two pictures demonstrate the sagittal plane, reconstructed by means of 3D TV US surface rendering. In right-hand side, the pictogram is highlighting both contours of both hemiuteri (the internal contour – the yellow line, the external contour – the red line, the operculated external os in the left side – the blue line). 3D TV US: Three-dimensional transvaginal ultrasound.*

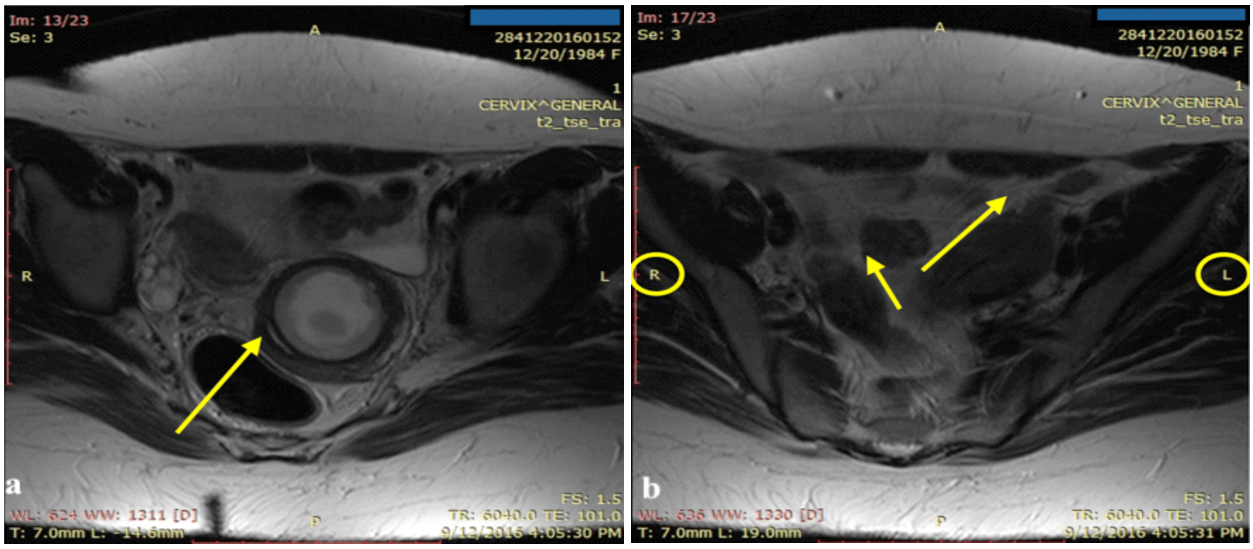

Figure 6 – *Case No. 2, MRI: Axial T2-weighted images showing (a) the fluid accumulation in the left cervix and the presence of two completely separated cervical canals, the one on the right (yellow arrow) appearing to have a virtual cavity; in (b), the different spatial arrangement and heights of the two uterine hemicorpus are highlighted. MRI: Magnetic resonance imaging.*

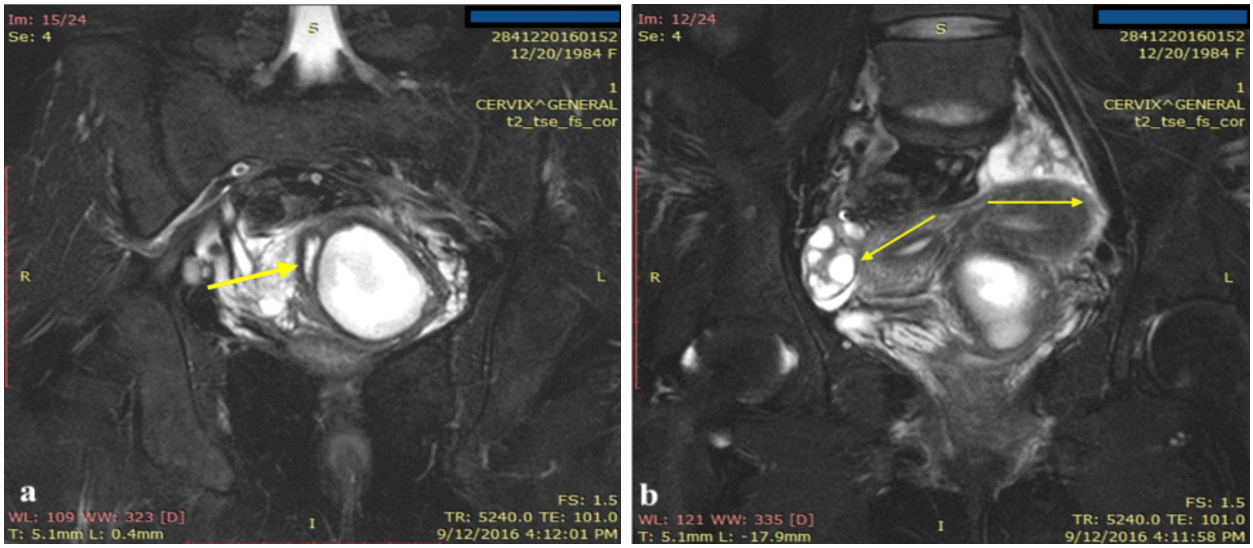

Figure 7 – *Case No. 2, MRI: Coronal T2-weighted images showing the presence of two cervical cavities (a), almost linear hyperintense collapsed right cervix, and the bulky left-sided one. Two divergent uterine bodies (b). MRI: Magnetic resonance imaging.*

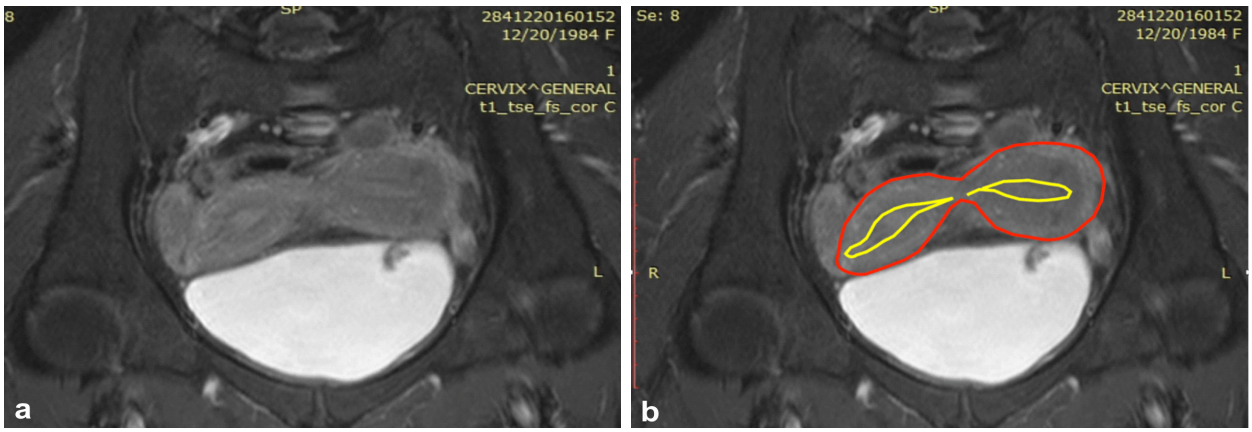

Figure 8 – *(a and b) Case No. 2, MRI: Coronal T2-weighted images demonstrating the visualization by means of MRI of the internal and external contours of the two uterine bodies. In right-hand side, the pictogram is highlighting both contours of both hemiuteri (the internal contour – the yellow line, the external contour – the red line. MRI: Magnetic resonance imaging.*

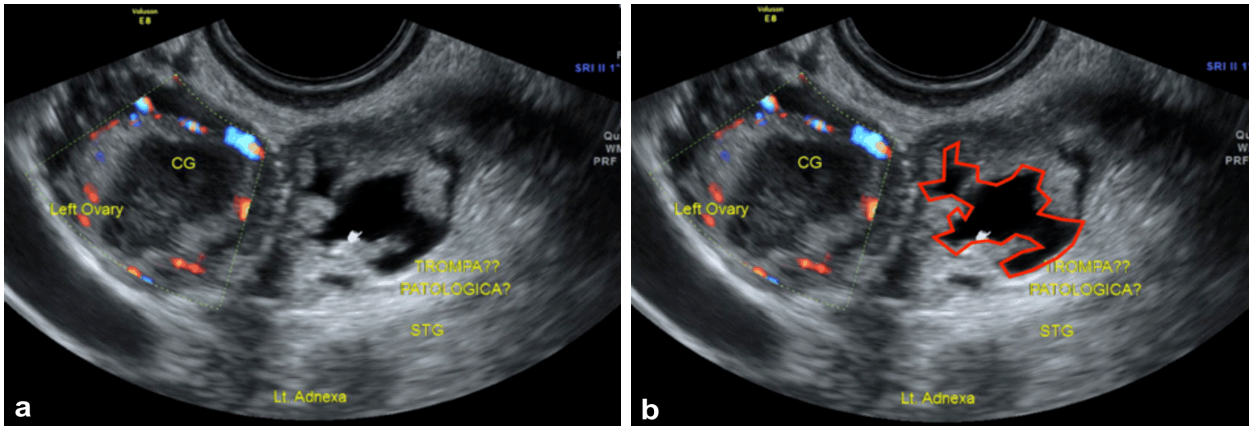

Figure 9 – *Case No. 2, 2D TV US. Acute salpingitis – typical 2D US images: the "cogwheel sign". Also, the image confirms the presence of corpus luteus (postovulatory status) (a). In right-hand side, the pictogram is highlighting the internal contour of the left tube (b). 2D TV US: Two-dimensional transvaginal ultrasound.*

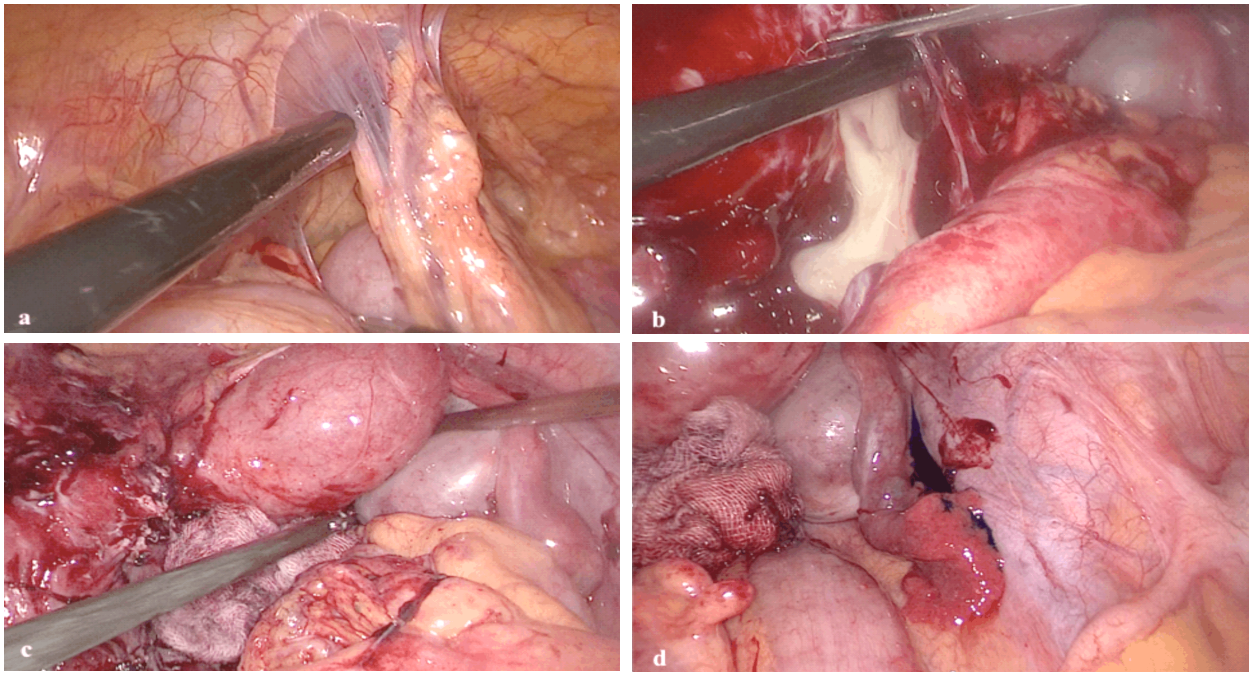

Figure 10 – *Case No. 2, intraoperative images (laparoscopy). Images highlighting: (a) Chronic pelvic inflammatory disease, multiple adhesions; (b) Incidental opening of the left tube, with the exteriorization of the pus-like fluid inside it; (c) The final aspect after laparoscopic left salpingectomy – in the image, the right uterine hemicorpus and the right adnexa (tube and ovary) seen; (d) The chromopertubation test, showing the normal passage of the dye through the patent right tube.*

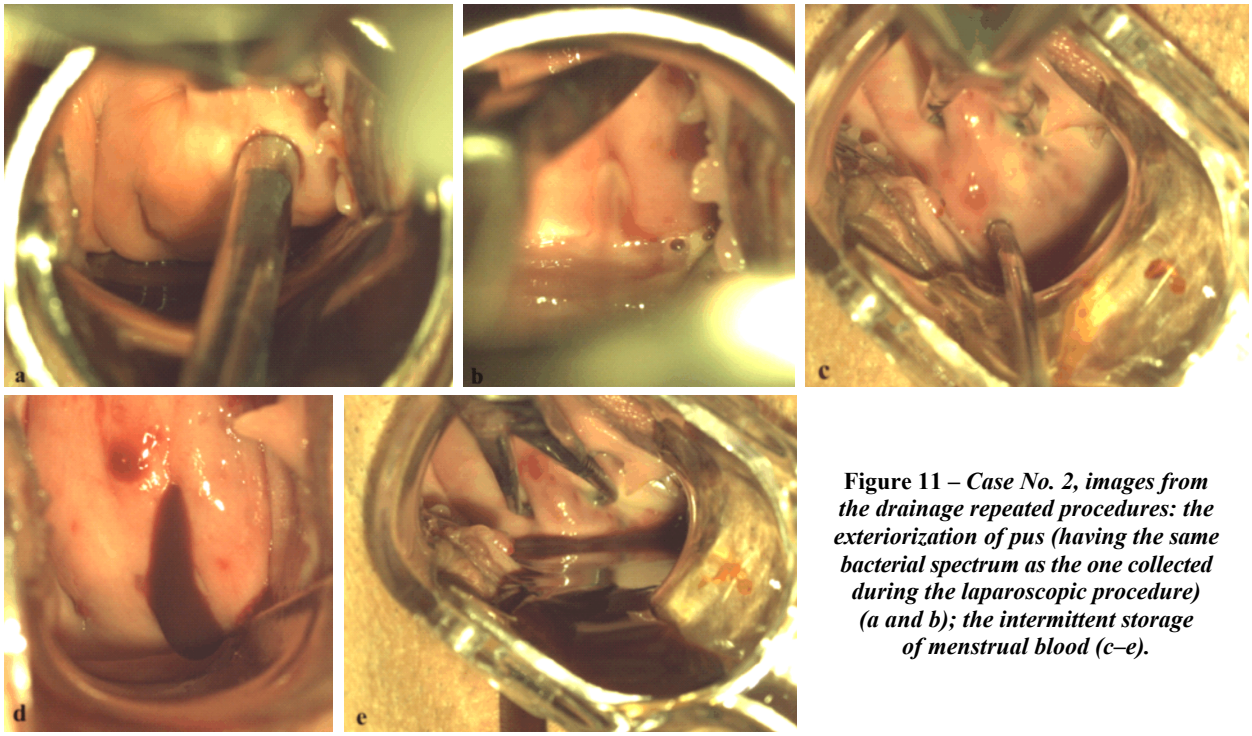

Figure 11 – *Case No. 2, images from the drainage repeated procedures: the exteriorization of pus (having the same bacterial spectrum as the one collected during the laparoscopic procedure) (a and b); the intermittent storage of menstrual blood (c–e).*

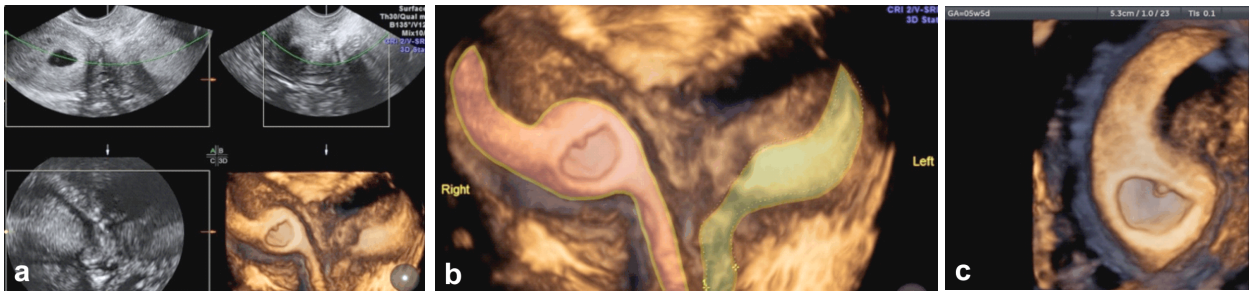

Figure 12 – *Case No. 2: (a) The three pictures demonstrate the sagittal plane, reconstructed by means of 3D TV US surface rendering; (b) In the second one, the internal contour of the two hemiuteri are highlighted in pale colors; (c) The last image shows the right uterine corpus only, having the typical shape of "banana" and the low implantation of the gestational sac, at 5 weeks + 5 days of amenorrhea. 3D TV US: Three-dimensional transvaginal ultrasound.*

Discussions

The incidence of MDAs was estimated at 0.16–10%, although its true prevalence is still controversy field [14]. The available studies used different diagnostic modalities, various classification systems and dissimilar terminologies. Also, there were discrepancies in population-dependent characteristics.

Uterus didelphys seems to be the second least common type of lesion in the MDAs group [19]. The diagnostic of uterus didelphys is often incidental, because the condition, if isolated, does not induce any symptoms [20]. The incidence is low and was probably underestimated, due to low availability of 3D TV US until recent years.

The least common form of all congenital uterine malformations is HWWS [21]. With a difficult to establish prevalence (estimated at 0.1–3.8% [22]), it represents 0.16–10% of all MDAs, and the published literature abounds in case reports, large case series being scarce.

Although exquisitely described for the first time by Embrey as early as in the 50s [23], some authors cite much earlier case reports (Purslow, 1922) [24, 25]. The syndrome became largely known due to a 20 years later publication [26], and nowadays we witness a growing experience with OHVIRA syndrome in literature, physicians being more acquaint with this congenital anomaly. The Herlyn–Werner syndrome was described by the naming authors in 1971, as "renal agenesis and ipsilateral blind hemivagina" [26]. Five years later, Wunderlich reported the "association of right renal aplasia with a bicornuate uterus and simple vagina in the presence of an isolated hematocervix" [27].

The OHVIRA term describes two features only from the HWWS triad and assimilates in the syndrome also cases without a didelphys uterus [28]. The uterus may present a normal corpus having two cervices, or may be have a median corporeal septum (septated uterus). Thus, the term OHVIRA – meaning "obstructed hemivagina, ipsilateral renal agenesis/anomaly" (agenesis, dysplasia, polycystic kidney, duplication or crossed fused ectopia) with/without an anomalous uterus –, describes the same clinical entity [29], having a broader significance. Despite the growing experience in literature, delays in diagnosis are often seen, creating the frame for complications (chronic infection, endometriosis, and adhesions, which may result in subfertility or infertility).

The exact etiology of HWWS still debated. The most accepted theory refers to an abnormal development of

the para- and mesonephric ducts. Didelphys uterus occurs subsequent to the failure of the fusion of the Müllerian ducts, which should give rise to cervix and uterus, during the 8th week of embryogenesis [30]. The Wolffian ducts are precursors of ureters and kidneys. In the unilateral absence, the fusion of the ureter and the kidney is hindered. The ipsilateral Müllerian duct is driven laterally to the urogenital sinus. This leads to the occurrence of a blind sac, corresponding to the obstructed hemivagina. The distal vagina is originating from the urogenital sinus. Thus, it will develop normally [31].

The conventional concept of Müllerian origin of proximal vagina cannot entirely explain complex urogenital abnormalities. According to a newer theory (Acién), mesonephric ducts are precursors of the entire vagina. The maldevelopment of mesonephros/mesonephric duct lead to absent ureters and absent ipsilateral kidney. The obstructed hemivagina and the stoppage of support to paramesonephric ducts prevent also the fusion of the two hemiuteri, with the uterus didelphys formation. This new hypothesis is able to explain all features present in OHVIRA syndrome [29]. With the spectacular progress of the prenatal diagnosis, a growing number of congenital anomalies are diagnosed in the fetal life, including the kidney agenesis. In these cases especially, the diagnosis of OHVIRA is suspected earlier, in the first days/months/ years after birth. Few cases in which the diagnosis was suspected in the neonatal period were reported, due to a mass prolapsing *per vaginum* [32–34].

Prenatal US is now routinely performed and signals the renal anomaly. As a consequence, many cases of OHVIRA are first seen by pediatric urologists, assessing referrals for dysplastic, atrophic, or absent kidney. There have been described spontaneously resolution in the first months of life (six months being considered the maximum time span of maternal estrogen effect that can cause vaginal bleeding) [33].

However, in the majority of cases, the HWWS is diagnosed in young, prepubertal/adolescent girls, after the onset of menstrual bleeding [17, 18, 31, 35]. In a large series of 27 cases, the median age at diagnosis was 14 years [36]. Also, it is rarely diagnosed during pregnancy or during the birth process [37, 38]. Although characteristic for pubertal age group, both our obstructive cases were diagnosed much later. They have had extremely mild symptoms until adult life, many years after the menarche. Our first case the OHVIRA syndrome was diagnosed at her first visit by the gynecologist, having mild abdominal pain during menses. The second was completely asymptomatic, and requested medical care after eight years of unexplained infertility.

The obstructed hemivagina usually causes menstrual blood to accumulate above the obstruction level, one-sided. This will progressively distend the vagina, the uterus and/or the Fallopian tubes, and will cause pelvic pain or mass. Many cases present with hugely distended vagina, due to (hemi)hemato(metro)colpos. Hyper-hypomenorrhea, intermittent vaginal spotting, menometrorrhagia, malodorous vaginal discharge, and/or urinary symptoms may occur.

The usual presentation of such cases is non-specific symptoms or cyclic abdominal pain (or worsening dysmenorrhea), due to progressive distention of the obstructed hemivagina, often associating a pelvic mass. The mass secondary to hematocolpos is a characteristic clinical finding, while longstanding dysmenorrhea and vaginal pain are the most frequent symptoms [39]. Yet, a wide spectrum of non-specific symptoms have been described, like vaginal bulge on pelvic examination and/or foul discharge, acute urinary retention, calcified vaginal mass or intrapartum rupture of the vagina [29]. According to the theory of metastatic implantation of endometrial tissue, external endometriosis may also develop [40, 41].

The condition includes classically renal agenesis on "the same" side of the obstruction, the embryological development defect in the 8th week affecting simultaneously the Müllerian and metanephric ducts [42]. We also found concordant genital-renal anomalies in our two reported cases. However, reports of various renal anomalies may be found, and also discordance between parts of genitalia *versus* kidney anomaly (left-sided dilated hemivagina with absent right kidney [43].

The hematic content may also develop infectious events [44, 45]. According to the literature, patients may develop rarely pyocolpos, pyocervix, pyosalpinx and peritonitis, as ascending infections. The retained discharge or the menstrual blood upstream obstruction of the hemivagina/ hemicervix is vulnerable for commensal germs [45]. In both our cases, the consequence of obstruction was infection. Both our patients were sexually active. The amount of accumulated fluid was very different, much larger in the first case. However, only the infertile patient, having a much smaller collection, without any clinical symptoms, developed pyosalpinx, probably due to a more fragile immune status and consequent ascending bacterial infection. Factors that influence the natural history of these abnormalities in terms of upper genital organs infection risk are to be studied.

Although the most frequent urogenital side affected reported is the right one [30, 46, 47], as previously reported, we encountered different sides affected.

Imaging is quintessential for the diagnosis of HWWS/ OHVIRA, and US is the initial investigation. US is frequently the first choice imaging modality to evaluate suspected MDAs in general. This is due to its wide availability and relatively low cost. Moreover, 3D TV US offers extremely accurate information about the external uterine contour and also the internal shape of the uterine cavity. However, US has a high operator dependency and malformations may be missed by inexperienced operators. In the vast majority of cases, the symptoms occur in childhood and early puberty, when the TV approach is not possible. MRI is an excellent examination for assessing complex MDAs before the beginning of sexual activity, thus cannot be approached transvaginal. The modality has multiplanar capability, a larger field of view than US, and a good tissue characterization. MRI can accurately depict the shape of the uterine cavity, the uterine contour, associated cervical, vaginal and other viscera anomalies, and can easily detect coexisting renal and/or urethral abnormalities. It easily identifies also the anatomy of (each) vaginal lumen, the characters of the septum, the graining/consistency of the fluid, and the associated pathology (endometriosis, pelvic adhesions, other viscera anomalies) [46]. We performed MRI in both cases, and 3D TV US was useful in the second case, the only one presented before pregnancy.

Complementary to the US and MRI, the most commonly used and useful is laparoscopy (LSK). In HWWS, diagnostic LSK is optional; LSK should be performed only if the imaging diagnosis is questionable or if MRI is not attainable. Although considered the gold standard for diagnosis by some researchers [24], in our view also, LSK is not mandatory. Yet, it may be useful in the diagnosis/treatment of tubal pathology (as in our second case), and in the diagnosis/treatment of endometriotic lesions and pelvic adhesions [45].

In selected cases, cystoscopy and vaginoscopy may be operational.

In both our cases, the type of malformation falls into category 2 according to ESHRE/ESGE, which includes irregular vaginal hemorrhage, pelvic inflammatory disease, a late discovery of the pathology and a late onset of the symptoms. As a group, HWWS is included in the class U3B uterine anomaly, often class C2 cervix anomaly, and class V2 vaginal anomaly [3]. Our first case will fall into the U3bC2V2 class, and the second in the U3bC2V1 class.

The septum between the two vaginal cavities/the two cervices may be fenestrated, allowing communication, or a fistula may be present [48]. In our two cases, any right-left communication in the lower genital tract was absent.

In the majority of cases, a classical variant of this syndrome is found, but in a representative percent, rare variants of this syndrome occur, having many therapeutic implications.

Early recognition of HWWS is important to avoid complications. Due to its rarity and due to regular menses from the non-obstructed hemivagina, the diagnosis is often delayed until complications of outflow obstruction lead to hematometra, hematosalpinx, retrograde bleeding, chronic pelvic pain, endometriosis [44], pelvic adhesions and infertility [45], or severe urinary tract infections [36, 42, 46, 47]. The diagnosis of HWWS is not always an easy one. The findings on physical examination, the symptoms and the patient's complains may be very non-specific, especially long term after menarche. This may lead to chronic undiagnosed HWWS [49]. Moreover, although the vaginal walls may be hugely distended, and upstream the obstructed hemivagina large amounts of menstrual blood may be accumulated, the absorption of blood between menses may hinder the occurrence/aggravation of the symptoms [24]. This feature was probably present in our first case. The impossibility of vaginal approach in virgin patients, the lower resolution of abdominal probes, the mild symptoms in some cases, the low index of suspicion and/or insufficient experience of the operators may lead to delayed diagnosis, thus to suboptimal treatment.

The ideal treatment of HWWS is still debated, but most authors agree that vaginal septotomy and drainage of hematocolpos restore the functionality of both hemiuteri in the majority of cases, eluding the necessity of hemi-hysterectomy [50, 51]. None of our cases requested such an approach. The pregnancies occurred spontaneously. Both cases required other surgical interventions: repeated decompression punctures in the first one, ipsilateral salpingectomy due to secondary ascendant infection and repeated therapeutic drainage of the obstructed cervix in the second.

Our two cases confirm that HWWS has the rather good obstetric prognosis reported in previous publications [34, 38, 46, 52–55].

Yet, in the literature (including the largest series of 87 of double uterus with unilateral cervico-vaginal obstruction and ipsilateral renal anomalies cases [56], patients that had didelphys uterus with unique, anatomically normal vagina and unilateral isolated cervical atresia (as we report in the second case) are exceptionally rare. To the best of our knowledge, our case is the sixth reported until present. Unilateral genital obstruction associated with this syndrome is vaginal in the vast majority of cases. The case is accurately classified as HWWS, presenting the complete triad of signs.

A new classification for the OHVIRA syndrome has been proposed taking into consideration the presence of the complete or incomplete vaginal septum [57]. Considering this classification, the first case would be integrated in class 1.1 (completely obstructed hemivagina with blind hemivagina), but the second case cannot be integrated in none of the suggested four classes.

Notably, both our patients experienced no failed previous pregnancy and were able to carry the first pregnancy near term/to term. In both C-section was performed, confirming the high-risk reported.

No cases of HWWS have been previously reported in Romania. We presented two rare, very different cases, resulting in good pregnancy outcome. They confirm the well-known wide anatomical variability of the structures involved (uterine-cervical-vaginal and renal) and support the difficulties in classifying and performing uniform analysis of reported cases. Although very rare, it is important for physicians to be accustomed with the condition, because the early diagnosis entails the prompt suspicion and this allows an appropriate management.

We presented late diagnosed cases, but the age at the diagnosis of HWWS will probably decrease in future years, with the spread of prenatal and postnatal US screening. The early suspicion of this syndrome should be considered in all neonates females and girls with unilateral renal agenesis (suspected prenatally and diagnosed/confirmed postnatally).

Conclusions

The HWWS/OHVIRA syndrome is a rare congenital anomaly with an important and heterogeneous clinical significance. We provided detailed description of two completely different cases having a favorable outcome in pregnancy. We described the sixth case of didelphys uterus with unique (anatomically normal) vagina and unilateral isolated hemicervix hypoplasia/atresia. Imaging is quintessential for the diagnosis of HWWS/OHVIRA, with MRI providing other viscera than genitalia details, thus superseding the US information in most cases. In these two cases 3D TV US, MRI and laparoscopy/laparotomy complemented each other, and the thorough clinical examination clarified the anatomy of the obstruction. The clinical course of the pathology is not standard and each patient should be treated accordingly, but term/near-term pregnancy resulting in healthy newborns is possible in HWWS. Future research should focus on the correlations between the different structural variants of the syndrome

and their clinical picture/obstetrical outcome. The latter will improve counseling of the couples desiring pregnancy.

Conflict of interests

None declared.

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