Double uterus with obstructed hemivagina and ipsilateral renal agenesis: pelvic anatomic variants in 87 cases

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STUDY QUESTION: What are the anatomic variants (and their frequencies) of double uterus, obstructed hemivagina and ipsilateral renal agenesis?

SUMMARY ANSWER: Most cases examined (72.4%) were of the classic anatomic variant of the Herlyn-Werner-Wunderlich syndrome (with didelphys uterus, obstructed hemivagina and ipsilateral renal agenesis) but the 27.6% of cases are of a rare variant of the syndrome (with uterus septum or cervical agenesis), showing relevant clinical and surgical implications.

WHAT IS KNOWN ALREADY: The extreme variability of anatomic structures involved in this syndrome (both uterus, cervico-vaginal and renal anomalies) is well known, even if a complete and uniform analysis of all its heterogeneous presentations in a large series is lacking.

STUDY DESIGN, SIZE, DURATION: This is a retrospective study with 87 patients referred to our third level referral center between 1981 and 2011.

PARTICIPANTS/MATERIALS, SETTING, METHODS: We analyzed the laparoscopic and chart records of 87 women, who referred to our institute with double uterus, unilateral cervico-vaginal obstruction and ipsilateral renal anomalies.

MAIN RESULTS: Sixty-three of 87 patients had the more classic variant of didelphys uterus with obstructed hemivagina; 10/87 patients had septate bicornis uterus with obstructed hemivagina; 9/87 patients had bicornuate bicornis uterus with obstructed hemivagina; 4/87 patients had didelphys uterus with unilateral cervical atresia; 1/87 patients had bicornuate uterus with one septate cervix and unilateral obstructed hemivagina.

LIMITATIONS: This is a retrospective study with a long enrolling period (30 years).

WIDER IMPLICATIONS OF THE FINDINGS: New insights in the anatomic variants of this rare syndrome with their relevant surgical implications.

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Key words: double uterus / Herlyn-Werner-Wunderlich syndrome / obstructed hemivagina / cervical agenesis / didelphys

¹ The authors consider that the first two authors should be regarded as joint First Authors.

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Introduction

The rare syndrome characterized by the presence of uterus duplicity, obstructed hemivagina and ipsilateral renal agenesis was first reported, in 1922, by Purslow (1922). Despite the increasing knowledge of this syndrome, in English scientific literature there are still few relevant case series published on this topic and there is not a unifying terminology to describe all its heterogeneous presentations (Rock and Jones, 1980; Stassart et al., 1992; Creatsas et al., 1994; Candiani et al., 1997; Haddad et al., 1999; Heinonen, 2000; Gholoum et al., 2006; Smith and Laufer, 2007; Vercellini et al., 2007). Indeed, an extreme variability of the anatomic structures involved in this syndrome (both uterus, cervico-vaginal and renal anomalies) is well known even if a complete and uniform analysis of all its heterogeneous presentations in a large series is lacking. Most case series to date have described the uterine anomalies in this syndrome as duplicated or didelphys uterus, but also septate and bicornuate uterus have been rarely reported (Rock and Jones, 1980; Stassart et al., 1992; Creatsas et al., 1994; Candiani et al., 1997; Haddad et al., 1999; Heinonen, 2000; Gholoum et al., 2006; Smith and Laufer, 2007; Vercellini et al., 2007). Unilateral genital obstruction associated with this syndrome is mainly vaginal, but also cervical obstruction or atresia has been sporadically described. Renal manifestation is classically ipsilateral renal agenesis; however, reports of duplicated and dysplastic kidney may be found (Rock and Jones, 1980; Stassart et al., 1992; Creatsas et al., 1994; Candiani et al., 1997; Haddad et al., 1999; Heinonen, 2000; Gholoum et al., 2006; Smith and Laufer, 2007).

In this paper we present a large institutional case series of patients with double uterus, unilateral cervico-vaginal obstruction and ipsilateral renal anomalies (87 women). Our aim is to define all the anatomic variants (and their specific frequencies) we could identify in this rare syndrome, underlining their great clinical and surgical implications.

Materials and Methods

Patients assessed in this study are 87 women with a genito-urinary malformation corresponding to the II class of the embryological—clinical classification of Acien and Acien, including the association of double uterus (didelphys, bicornuate or septum-complete or partial), unilateral cervico-vaginal obstruction (obstructed hemivagina-communicant, not communicant or septate and unilateral cervical atresia) and ipsilateral renal anomalies (renal agenesis and/or other urinary tract anomalies) (Acien and Acien, 2011). They were referred to our hospital between January 1981 and December 2011, 41 of these institutional cases being already included in the study of Vercellini et al. (2007). For all our 87 patients, we revised the original documentation and create a database for the analysis of data. All patients were nulliparous at the moment of examination. They complained of various symptoms: dysmenorrhoea (94%), spotting (41%), chronic pelvic pain (24%), vaginal discharge (14%), dyspareunia (14%), fever (3%) and acute abdomen pain (2%). All patients underwent physical examination, pelvic ultrasound [transabdominal and transvaginal or transrectal (bidimensional and tridimensional)] to evaluate uterine shape and diagnostic laparoscopy to confirm external uterine profile. At least one of the following examinations was also done to better evaluate the presence of intrauterine communications: pelvic MRI (67/87 patients) and hysterosalpingography (20/87 patients). Only 6/87 women underwent diagnostic hysteroscopy before entering our institute. None of the women underwent sono-hysterography. Uterine anomalies have been classified according to American Fertility Society/American Society for Reproductive Medicine (AFS/ASRM) classification (The American Fertility Society classifications of adnexal adhesions, distal tubal occlusions, tubal occlusion secondary to tubal ligation, tubal pregnancies, Mullerian anomalies and intrauterine adhesions, 1988). All patients also underwent urinary tract ultrasound scan to evaluate the urological system. None of the women underwent renal MRI. All women underwent appropriate surgical correction of genital anomalies (Table I) (Fedele et al., 2008). At the time of surgery, a diagnostic laparoscopy was performed. An endoscopic examination of the pelvis included assessment of the uterine external profile, fallopian tubes and ovarian morphology, presence of endometriotic foci and vesico-uterorectal ligament. Retroperitoneal masses representing pelvic displacement of kidney and general pelvic anatomy were also systematically investigated. No surgical complications occurred. The study was exempt from approval of the local institutional review board according to the ethics guidelines at our institution.

Table I Anatomic variants and surgical treatment.

<table>
<thead>
<tr>
<th>Genital anomaly</th>
<th>Surgical treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didelphys uterus with obstructed hemivagina</td>
<td>Vaginal excision of obstructive septum</td>
</tr>
<tr>
<td>Septate uterus with obstructed hemivagina</td>
<td>Vaginal excision of obstructive septum</td>
</tr>
<tr>
<td>Bicornuate bicollic uterus with obstructed hemivagina</td>
<td>Vaginal excision of obstructive septum</td>
</tr>
<tr>
<td>Didelphys uterus with monolateral cervical atresia</td>
<td>Laparoscopically assisted cervico-vaginal opening (cervicoplasty)</td>
</tr>
<tr>
<td>Bicornuate uterus with septate cervix and obstructed hemivagina</td>
<td>Vaginal excision of obstructive septum</td>
</tr>
</tbody>
</table>

Results

All subjects were Caucasian women with a mean age of 20.7 years (range 11-42 years). In all cases complete data were easily collected and laparoscopic inspections were adequate, allowing the assessment of all characteristics under study (Table II). The uterus was didelphys in 67/87 cases (77%), bicornuate in 10/87 cases (11.5%, unicollis in 1/10 cases), septate bicornis in 10/87 (11.5%, complete septum in 8/10 cases). Obstructed hemivagina was present in 83/87 patients (95.4%); communicant with the contralateral hemivagina in 16/83 cases (19.3%) and longitudinally septate in 4/83 (4.8%). 4/87 patients had unilateral cervical atresia (4.5%). Unilateral obstruction was right sided in 53/87 cases (60.9%) and left sided in 34/87 cases (39%). All patients had urinary tract anomalies. Ipsilateral renal agenesis was diagnosed in 83/87 patients (95.4%). In four cases (4/87, 4.5%) an ipsilateral dysplastic hypoplastic kidney was found and in one patient it was pelvic. In 5/87 women the functioning kidney had a doubled proximal urethra (5.7%). Ovaries were bilaterally present in all patients presenting all stages of follicular development on the ovarian surface. In five cases an endometriotic ovarian cyst was present unilaterally. Endometriosis was found in 12/87 patients (13.8%): in 10 cases on peritoneum, in 5 cases on the ovary and in 1 case each on the fallopian tube and diaphragm. Hema-tosalphinx was diagnosed in 9/87 patients (10.3%). In all other cases the fallopian tubes were macroscopically regular. Vesico-rectal ligament

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was visualized in 4/87 patients (4.5%), all with didelphys uterus. None of these fibromuscular streaks was thicker than 1 cm. Other findings were 3/87 patients had mesosalpinx cysts, 3/87 patients had bilateral inguinal hernias and 2/87 patients had complex vascular malformations (persistence of cave vein sub-renal tract) diagnosed at pelvic MRI.

In conclusion: 63/87 patients (72.4%) had the classic variant of didelphys uterus with blind hemivagina (11/63 cases with communicant vaginal septum, 3/63 cases with pluriseptate obstructed hemivagina); 10/87 patients (11.5%) had a septate bicollis uterus with blind hemivagina (4/10 cases with communicant hemivagina and 1 of pluriseptate obstructed hemivagina); 9/87 patients (10.3%) had bicornuate bicollis uterus with blind hemivagina (1/7 case with communicant hemivagina); 4/87 patients (4.5%) had didelphys uterus with unilateral cervical atresia; 1/87 (1.1%) patient had a bicornuate uterus with one septate cervix and unilateral obstructed communicant hemivagina (Fig. 1).

Discussion

Our study presents a detailed description and frequency of urogenital anatomic variants included in the variously defined Herlyn-Werner and Wunderlich syndrome, OHVIRA syndrome, double uterus and obstructed hemivagina syndrome (Herlyn and Werner, 1971; Wunderlich, 1976; Candiani et al., 1997; Smith and Laufer, 2007). Interestingly, all these conditions are the result of a disruption in the continuum of embryological development of the urogenital system, probably, the caudal portion of one Wolffian duct with secondary involvement of the ipsilateral Müllerian duct. On the affected side, in fact, Wolffian duct anomaly accounts for failure of regular ureteric budding and kidney differentiation (with consequent renal agenesis and other anomalies), as well as an abnormal location of ipsilateral Müllerian duct. The result being failure of the aberrant Müllerian duct to fuse with both its opposite counterpart and with the urogenital sinus: the creation of different types of double uterus and cervico-vaginal obstructions depending on the level of misfusion (Acien, 1992; Vercellini et al., 2007).

To our knowledge, our case series (comprehending the institutional cases already cited by Vercellini et al.) represents the largest and most homogeneous ever reported in scientific literature (Vercellini et al., 2007). In our paper, we re-examined the original documentation of

Table II Patients’ anatomic characteristic according to AFS/ASRM (American Fertility Society/American Society for Reproductive Medicine) classification (11).

<table>
<thead>
<tr>
<th>Uterus (no., %)</th>
<th>Uterus subtypes (no.)</th>
<th>Obstructions (no., %)</th>
<th>Obstruction subtypes (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didelphys (67, 77%)</td>
<td></td>
<td>Obstructed hemivagina (63, 71.2%)</td>
<td>Not communicant (49)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cervical agenesis (4, 4.5%)</td>
<td>Communicant (11)</td>
</tr>
<tr>
<td>Septate bicollis (10, 11.5%)</td>
<td>Complete (8)</td>
<td>Obstructed hemivagina (10, 11.5%)</td>
<td>Not communicant (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communicant (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Septate (1)</td>
</tr>
<tr>
<td>Septate bicollis (10, 11.5%)</td>
<td>Uncomplete (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicornuate (10, 11.5%)</td>
<td>Bicollis (9)</td>
<td>Obstructed hemivagina (10, 11.5%)</td>
<td>Not communicant (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communicant (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Septate (0)</td>
</tr>
<tr>
<td>Unicollis septatea (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1 Anatomic illustration and description of the utero-vaginal patients’ anatomy.
all 87 patients included in the study, using common diagnostic criteria. Certainly, the great lapse of time passed from the beginning of the data collection up to study completion limits descriptive accuracy. Notwithstanding, our institute represents a referral center for the treatment of genital anomalies and so great attention is used to guarantee the application of standardized clinical protocols and the preservation of reports.

In the past literature, only Acien and Acien, attempting to update the classification system of female genital malformations, mentioned in his II class all the anatomic variants we also found in our study (Acien and Acien, 2011). Acien and Acien, however, did not consider the frequency of the different anatomic variants listed and the possible association with other congenital malformations or pelvic anomalies. Awareness of these variant syndromes is important for health-care providers from both diagnostic and therapeutic perspectives. The finding of a uterus septum could cause a delay in this syndrome diagnosis if we do not keep in mind that 11.5% of double uteri with obstructed hemivagina/unilateral cervical agenesis is septum. Moreover, a diagnosis of double uterus with unilateral renal agenesis associated with a pelvic hematic mass could let us presume to be in the presence of an obstructed hemivagina. Notwithstanding, even if this is the most probable finding, we should keep in mind that we could also face a unilateral cervical atresia (4.6%), requiring a more complex surgical correction. On the other side, the treatment of a patient diagnosed with double uterus and obstructed hemivagina is generally limited to the excision of the obstructive septum to relieve patient symptoms, presuming an association with a didelphys uterus. However, above all, in cases of longstanding infertility, the diagnosis of uterine type should be clarified because patients with uterine septum could greatly benefit from surgical correction with uterine septum hysteroscopic excision. In conclusion, when treating these patients, we should always keep in mind that in the majority of cases (72.4%) we face a classical variant of this syndrome but in about 27.6% of cases we could diagnose a rare variant of this syndrome with all its therapeutic implications. Future research should analyze the relationship between the different anatomic variants found in this syndrome and their clinical findings (referring particularly to obstetrical prognosis) to improve counselling to patients at the moment of diagnosis.

**Authors’ roles**


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**Conflicts of interest**

None declared.

**References**


