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Diagnostic Methods in Pediatric and Adolescent Gynecology

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Abstract

The evolving role of imaging techniques and endoscopic tools used in gynecologic practice has become essential over the last several years. Pelvic organs of the young girl are deeply hidden in the abdomen and the vagina is narrow and atrophic. The presence of an intact hymen provides an additional obstacle to vaginal examination. Therefore, bimanual pelvic (vaginal/rectal) examination has a limited advantage in this population. It could cause unnecessary discomfort and hamper further ‘patient-doctor’ dialog. Imaging techniques are constantly improving in sensitivity, thus providing more accurate diagnoses. Ultrasonography which is a safe and available modality provides real-time images of multiple planes and therefore is ideal for pelvic evaluation. It should be an integral part of child and young adolescent examination. Additional modalities such as CT and MRI should be reserved for cases which are ultrasonography doubtful and be applied as a subsequent evaluation. Vaginoscopy and laparoscopy, although invasive, are used for final diagnosis and provision of treatment as ‘see and treat’ procedures. These main modalities used in the diagnosis of gynecologic disorders in the young are described in this chapter.

Ultrasonography

Ultrasonography (US) is the modality of choice for imaging the pediatric female pelvis. It remains the most useful modality used in pediatric and adolescent gynecology and often the only one necessary prior to therapeutic intervention.

The principle of ultrasound involves the use of high-frequency sound waves to detect the interface of two tissues with different densities. Energy is reflected based on the density of the tissue and converted into two- or three-dimensional images.

Three approaches utilizing different ultrasonic probes, might be applied for imaging of the female pelvis. The transabdominal sector probe is most widely used in pediatric gynecology and suffices for most indications. Transvaginal probe used only in sexually active adolescents and the perineal approach may be useful in young children with lower genital tract pathologies.
The high-frequency transducers applied to scan the pelvic organs, varying in wavelength, are based upon the age of the patient and the distance of the pelvic viscera from the scanned area. Neonates are classically examined with 9- to 7.5-MHz transducers, children's pelvis best visualized with 5- or 7.5-MHz transducers and teenagers with the 5- to 3.5-MHz transducers.

Abdominal sonographic imaging requires an adequately distended urinary bladder which allows transmissions of sound into deeper structures of the pelvis and displaced gas-filled bowel loops out of the pelvis allowing easier identification of the uterus and ovaries. This can be achieved by hydration either by drinking, the common use, or by intravenous supply of fluids in patients with impending surgical intervention. In very young infants who cannot hold a distended bladder, a 100 ml fluid package could be placed on the infants lower abdomen with the US probe scanning through this 'artificial' bladder [1].

Doppler US and color Doppler imaging are based on sound waves that encounter a moving object; the reflected frequency is changed and can be detected. This shift in frequency is proportional to the velocity of the moving object and can be used to evaluate blood flow. It allows rapid identification of normal vessels and abnormal vascular structure, thus making the diagnosis more accurate [2].

Normal Ultrasonographic Anatomy of Genital Organs in Children and Adolescents

The Uterus
Uterine anatomy changes during childhood. The neonatal uterus is enlarged under the influence of maternal and placental hormones. The cervix is more prominent than the fundus (fundus-to-cervix ratio = 1/2), the uterine length is approximately 3.5 cm, and the maximum thickness is approximately 1.4 cm, with echogenic endometrial lining. Some fluid can also be seen within the endometrial cavity in about 25%.

In the prepubertal child, during the remarkable decline in sex steroids levels between the ages of 6–12 months up to puberty, the size of the uterus and ovaries decrease progressively. The uterus develops a tubular configuration (anteroposterior cervix equal to anteroposterior fundus) or sometimes a spade shape (anteroposterior cervix larger than anteroposterior fundus). The length is approximately 2.5 cm and the thickness does not exceed 10 mm. The endometrium is normally not apparent; however, high-frequency transducers can demonstrate the central lining in some cases (fig. 1).

At puberty when the hormones achieve the adult levels, the uterus gets the adult pear configuration (fundus larger than cervix) (fundus-to-cervix ratio = 2/1 to 3/1) and is 5–8 cm long, 3 cm wide, and 1.5 cm thick. The endometrial lining is seen and varies with the phases of the menstrual cycle. Difference in bladder distension can modify the uterine shape [3].
The Ovaries
Ovarian size is usually described by assessment of the ovarian volume: \( V = \frac{1}{2} \times \text{length} \times \text{width} \times \text{depth} \) (simplified formula for a prolate ellipse). In infants, measurements are slightly greater than 1 cm\(^3\) for the first year of life and 0.67 cm\(^3\) for the second year. The mean ovarian volume in girls less than 6 years of age is less than or equal to 1 cm\(^3\) (fig. 2).

The increase in ovarian volume begins after 6 years of age at the time of increasing hypothalamic activity. In prepubertal girls (6–10 years old), ovarian volumes range from 1.2 to 2.3 cm\(^3\), with the upper limit for normal size up to 4–5 cm\(^3\). In premenarchal girls (11–12 years old), it ranges from 2 to 4 cm\(^3\). After menarche, the ovarian volume reaches the normal adult size – 8 cm\(^3\) (range, 2.5–20 cm\(^3\)) [4].

The ovary contains follicles at all ages, usually <9 mm in size in the prepubertal period. Those follicles are routinely imaged (in 84% of cases from birth to 24 months of age and in 35.5% of cases between 2 and 9 years of age) [5] (fig. 3).

The normal size of the ovaries and the uterus during childhood and adolescence is listed in table 1.

Ultrasonography appears as a useful tool in the follow-up of puberty process.

Pubertal development is characterized by increased gonadotropic activity and heightened estrogen levels. Estrogen stimulation is indicated by thickness and volume of the uterus, swelling of the fundus and the presence of an echogenic endometrium. The appearance of the ovaries is less useful because of the overlapping measurements and because of the normal visibility of follicles at all ages.

Doppler of the uterine artery is a useful complementary parameter to follow puberty. The narrow systolic flow waves found in prepubertal girls is progressively

Fig. 1. Infantile uterus.
Fig. 2. Prepubertal ovaries. Note the presence of small follicles.

Fig. 3. Normal appearance of ovary at the beginning of puberty (microcystic). Note the small multiple follicles.

Table 1. Normal volume of the ovaries and uterus

<table>
<thead>
<tr>
<th>Age</th>
<th>Ovarian volume ml</th>
<th>Uterine volume ml</th>
<th>Uterine shape</th>
<th>Endometrial stripe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonate</td>
<td>1–3.6</td>
<td>2.6–4</td>
<td>spade shape</td>
<td>echogenic</td>
</tr>
<tr>
<td>3 months to 1 year</td>
<td>1–2.7</td>
<td>0.8–1.3</td>
<td>tubular shape</td>
<td>hypoechoic</td>
</tr>
<tr>
<td>1–2 years</td>
<td>&lt;1–1.6</td>
<td>0.8–1.3</td>
<td>tubular shape</td>
<td>hypoechoic</td>
</tr>
<tr>
<td>2–8 years</td>
<td>1–4.3</td>
<td>0.8–1.6</td>
<td>tubular shape after puberty</td>
<td>cyclical changes</td>
</tr>
<tr>
<td>8–16 years</td>
<td>2–18.3</td>
<td>0.8–25</td>
<td>pear shape after puberty</td>
<td></td>
</tr>
</tbody>
</table>

Adapted with permission from Stranzinger and Strouse [4].
replaced by a systolic-diastolic flow wave. This modification of the Doppler pattern will appear earlier than the changes in size and morphology of the internal genital organs [2].

**Ultrasonographic Imaging of Pathologic Conditions**

*Precocious Puberty*
The erroneous pubertal development occurring before the age of 8 years old is defined as precocious puberty.

US can demonstrate adult size ovaries with increase in follicle size and number. The uterus changes from tubular shape to pear shape with increased echogenicity and thickness of the endometrium. Prominent endometrium suggests that pubertal concentrations of estrogen have been attained and can be used for monitoring of effective inhibitory treatment. Endometrium of 6–8 mm thickness implies imminent menarche.

These changes are expected in true precocious puberty but not in premature isolated telarche or adrenarche.

Doppler study of uterine artery is helpful in the follow-up of girls with precocious puberty, the technique will also help to monitor the effect of medical treatment [6].

*Ambiguous Genitalia*
Most cases of ambiguous genitalia consist of female pseudohermaphroditism due to congenital adrenal hyperplasia. The role of sonography in sex assignment is to document the presence of uterus and ovaries. The clinical signs of ambiguous genitalia together with the US findings of a uterus and enlarged adrenals are almost pathognomonic of congenital adrenal hyperplasia. Absence of the ovaries (the very small uterus could be missed) should rise the suspicion of XY genotype.

*Foreign Body*
Vaginal bleeding and blood-stained, foul-smelling discharge are considered to be the main clinical manifestations of vaginal foreign bodies. Although not infrequent in occurrence, the insertion of the object is often forgotten by the child. Toilet tissue in the form of amorphous material is the most common type of vaginal foreign body found and it is usually radiolucent and can occasionally be demonstrated as a slight indentation of the posterior bladder wall [7].

Sonographic vaginogram performed by retrograde injection of water into the vagina while viewing the vaginal lumen transabdominally can improve the detection of a foreign body [8].

*Turner Syndrome*
Patients with XO karyotype have a prepubertal uterus (could be even undetectable) and nonvisualized or streaky ovaries. In girls with Turner’s mosaic karyotype (40–
50%), varying ovarian activity has been demonstrated. In those patients ultrasound antral follicular count (AFC) may be used for predicting future fertility, contributing to decision whether perform early ovarian cryopreservation [9].

US might be useful in the monitoring of hormone replacement treatment for achieving sexual characteristics and estrogen treatment should be followed by adding cyclic progesterone just after pubertal concentrations of estrogen have been attained, as demonstrated by thickening of the endometrium.

**Obstructive Uterovaginal Anomalies**
Teenagers with obstructive uterovaginal anomalies present with amenorrhea and cyclic abdominal pain. Imperforated hymen, most frequent anomaly, sonographically characterized by a fluid-filled mass posterior to the bladder representing the dilated vagina (hematocolpus) and possibly a fluid-filled uterus (hematometrocolpos).

Sonographically, the fluid-filled vagina appears as an oval thin-walled structure with absent or low level internal echoes or may contain a urine mucus level.

US is very valuable in differentiating the frequent case of hemato(metro)colpos due to imperforate hymen or transverse vaginal septum from the rare case of hematometra due to cervical dysgenesis or other Müllerian system anomalies. The diagnosis of those in the pediatric age is possible if there is high grade of suspicion. In girls with Mayer-Rokitansky-Kunster-Hauser syndrome, functioning endometrial tissue may present in 6–10% as unilateral hematometra and cause cyclic abdominal pain. Renal anomalies such as renal agenesis and pelvic kidney occur in 30–50% of the cases [10].

**Three-Dimensional Sonography**
Three-dimensional ultrasound has improved the ability to characterize congenital uterine anomalies, but may still be limited in patients where the uterine horns are incompletely visualized secondary to patient body habitus or bowel gas. The visualization of the external uterine contour is important in the distinction between bicornuate and septate uteri since a uterine septum can be removed with hysteroscopic resection. The distinction criteria are summarized in table 2, based on the external contour of the uterus and the depth of fundal midline indentation.

**Pelvic Pain**
US is the initial imaging modality in children or adolescents with acute or subacute pelvic pain.

**Adnexal Torsion**
Torsion of the ovarian pedicle is the fifth most common gynecologic emergency, occasionally resulting in late diagnosis and treatment due to inconsistency of its clinical presentation. The most common ultrasound finding in ovarian torsion is an enlarged ovary, more than double in size compared to the normal ovary. The involved ovary may have multiple enlarged follicles at the periphery measuring
8–12 mm in diameter, these cysts seem related to transudation of fluid into the follicles as a result of vascular congestion (found in 74% of twisted ovaries). The ovarian parenchyma shows a spectrum of findings ranging from edema to necrosis [11].

Absence of flow at color Doppler US is not a reliable diagnostic criteria because Doppler waveforms are not obtained in about 30% of normal ovaries in young girls. Indeed, arterial flow (peripheral or even central) can be seen in surgically proved twisted ovaries, reflecting the dual blood supply from the uterine and ovarian vessels. The whirlpool sign, visible as a clockwise or counterclockwise wrapping of the hypoechoic vessels around the central axis, was demonstrated in all cases with approved torsion [12].

Pelvic Inflammatory Disease
Clinical presentation may have vague symptoms and signs. Ultrasonographic imaging supplies additional clues to the diagnosis.

In the early stage, an ‘ill-defined uterus’ can be seen due to indistinct demarcation between the uterus and ovaries. When pyosalpinx is presented, a tubular structure containing internal echoes can be observed. In the late stage of the disease, the tubo-ovarian abscess presents initially as a solid mass and may appear later, when necrosis and liquefaction occurs, as a uni- or multilocular cystic mass with irregular, thickened walls. Color Doppler imaging can show hypervascularization of the inflamed ovary [13].

Chronic Pelvic Pain
Abnormalities causing chronic pelvic pain as endometriotic implants, adhesions and others are hardly seen on US. Pelvic congestion syndrome occasionally involved in the pathogenesis of chronic pelvic pain can be demonstrated as positive Doppler flow in enlarged multiple tortuous hypoechoic vessels that are consistent with pelvic varices [14].
Ovarian Masses

Ovarian Cysts
Functional ovarian cysts are the most common cystic pelvic mass. Sonographically detected cysts are present in 84% of ovaries identified during the first 2 years of life and in 68% of ovaries identified in children aged 2 through 12 years.

The size of normal ovarian follicles in children is usually 9 mm in diameter. However, cysts up to 2 cm are still defined as follicles. Larger cysts (more than 2 cm) may be pathologic, particularly if persistent. Follow-up ultrasound of ovarian cysts is recommended to ensure resolution.

Other cystic masses which can be seen in the pelvis include hematocolpos, ovarian neoplasms, mesenteric cysts, meconium pseudocysts, duplication cysts, urachal remnants, Meckel diverticulum, ureteroceles, dilated ureters, hydronephrosis, vascular and lymphatic malformations, abscess, hematoma and endometrioma.

Hemorrhagic Ovarian Cyst
Ultrasonography imaging of a corpus luteum cyst shows a complex adnexal mass with increased through transmission, thus reflecting its cystic nature. Free fluid can often be observed. Hemorrhagic cysts are avascular at color Doppler sonography. A changing sonographic appearance over time caused by clot lysis is an important diagnostic feature [3].

Ovarian Neoplasms
Benign tumors and functional cysts are much more common than any malignant ovarian tumor in the young patient (2/3 benign, 1/3 malignant) and sonography can suggest a histological diagnosis in up to 50% of the cases (fig. 4).

Benign mature teratoma (Dermoid cyst), the most frequent neoplasm, is commonly discovered by chance. It has a typical appearance of hypoechoic mass with an echoic/solid nodule associated with distal acoustic shadowing representing either calcification or mixture of sebum, air and teeth (fig. 5).

Knowing the high sensitivity of US diagnosis (97.4%) as well as the low malignant potential (0.17%), those tumors could be followed up conservatively [15].

Malignant pelvic neoplasms of gynecologic origin are rare in children and include sex cord stromal tumors (granulosa cell, theca cell, fibroblast, Leydig and Sertoli cells) and germ cell tumors (dysgerminoma, malignant teratoma, endodermal sinus tumor, embryonal carcinoma, choriocarcinoma).

Indicators of malignancy at US are mostly the presence of peritoneal implants, ascites, lymphadenopathy, or hepatic metastases; the characteristics of the mass are less indicative.

Vaginal rhabdomyosarcoma (botryoid) appears as a large heterogeneous or hypoechoic mass posterior to the bladder; the mass effect may cause distortion of the bladder base [4].
Polycystic Ovaries

There is growing acceptance that polycystic ovaries, as appearing on US, are important markers of polycystic ovary syndrome (PCOS).

Ovaries are enlarged 1.5–3 times larger and more echogenic than normal with stromal hypertrophy. Multiple small immature cortical cysts are seen at the periphery of the ovary (fig. 6). The current ultrasound guidelines supported by the ESHRE/ASRM consensus characterize the polycystic ovary as containing 12 or more follicles measuring 2–9 mm and/or an increased ovarian volume of >10 cm³. The cutoff value for an increased ovarian volume was derived from cumulative reports of a larger
mean volume for polycystic ovaries compared to a mean volume of <10 cm³ for normal ovaries. A subjective assessment of stromal echogenicity and follicle distribution pattern is no longer included [16].

Computed Tomography and Magnetic Resonance Imaging

These techniques, although less available and not easy performed as sonography, may still be advantageous when the sonographic findings are incomplete or inconclusive. In these cases, CT and MRI are helpful in clarifying abnormalities.

The choice between CT and MRI should take into account the need to sedate (especially for MRI), accessibility to the technique (especially for MRI), and irradiation (CT).

Conscious sedation is usually required for CT and MRI of young children. MRI often requires a relatively longer examination period and is extremely sensitive to motion artifact, so most patients younger than 7 years of age require sedation.

Computed Tomography

The principles of CT involve variable attenuation (absorption) of an X-ray beam as it passes through tissue based on the tissue’s density, providing the computer with information to generate cross-sectional images. The technological advantage of CT is that CT can distinguish a difference in tissue attenuation of 0.1%, unlike conventional radiographs that record differences in attenuation of about 10%, preventing detailed characterization of various soft-tissue densities.

For ovarian masses, CT allows delineation of the lesion and surpasses US and MRI in the ability to detect the presence of subtle areas of calcium or fat within
the pelvic mass, which can sometimes be fine and not visible using other imaging techniques.

It can be a useful adjunct to sonography for confirmation of the diagnosis in cases of teratoma (dermoid cyst) because of its ability to characterize the fat and calcification present in most teratomas.

CT remains the most useful imaging modality for tumor staging before operative treatment and for further follow-up [3].

**Magnetic Resonance Imaging**

MRI is based on the fact that a nucleus with an odd number of protons or neutrons has inherent spin, allowing it to behave as a magnet. MRI takes advantage of the ability to induce and monitor the resonance of the magnetic moment of nuclei in magnetic fields. The interplay of the relaxation times (T1 and T2) and the concentration of hydrogen ions in tissue determine the intensity of signals that are converted to images. Each tissue has a characteristic T1 and T2 relaxation time as well as hydrogen ion concentration, whereby specific characteristics can be detected.

MRI provides precise demonstration of anatomic features in multiple planes in cases of complex anomalies like urogenital sinus or persistent cloaca when US findings are nonspecific (although with the increasing availability of three-dimensional sonography, this is a less important consideration) (fig. 7).

It is particularly useful in evaluating masses of musculoskeletal and those arising in the presacral space [14].

MRI is also helpful in evaluating complex adnexal masses such as endometriomas and cystic teratomas in circumstances where the sonographic diagnosis is unclear. In a study on the impact of MRI on adnexal mass treatment in 49 patients scheduled for

![Fig. 7. Bicornuate uterus. Note the concave fundal contour as demonstrated by MRI.](image-url)
surgery, 73% either did not have surgery or had a less-invasive procedure after MR evaluation [17].

It can be more useful than CT in determining the site of the original tumor, local tissue invasion, tumor staging and response to therapy, as well as showing local invasion, inguinal adenopathy and distant metastases.

Endometriosis is a particularly difficult diagnosis in virgin patients. Endometrial implants are scattered throughout the pelvis and abdomen. These are typically not visualized sonographically but can be seen as regions of high signal intensity on T1-weighted gadolinium-enhanced fat-suppressed images. Since very small lesions can be missed by MRI, laparoscopy remains the gold standard for diagnosis.

The diagnosis of simple hydrosalpinx is typically made by sonography. However, in the case of a complex cystic adnexal mass, it may not be possible to establish the tubular nature of the process by sonography and MRI can be helpful in demonstrating incomplete septations and a separate normal ovary.

In cases of ovarian torsion with nonspecific clinical and sonographic appearance, to suggest an immediate surgical approach, MRI can be helpful. Findings on MRI include enlarged ovary with multiple peripherally displaced follicles. The ovarian stroma is of low signal intensity on T1-weighted images and of high signal intensity on T2-weighted images due to the edema. Lack of enhancement after administration of gadolinium is diagnostic.

**Vaginoscopy**

Inspection of the vagina may be necessary in childhood whenever abnormal bleeding or persistent vulvovaginitis occurs. The narrow hymenal orifice is a significant obstacle to the physician. Traditionally, use of a pediatric speculum can cause unnecessary discomfort and a further psychosexual negative impact.

The vaginoscope is used to minimize invasive evaluation of the vagina without hymen injury. Nowadays, endoscopes are available measuring 3–5 mm in their outer diameter, in accord with the diameter of a hymen orifice. Due to cold light sources supplied by optical fibers, as well as an integrated system magnifying the picture, contemporary vaginoscopes provide fair visualization of the vaginal wall and vaginal part of the uterine cervix (fig. 8). Continuous flow vaginoscopy is performed by irrigating fluid with normal saline (NaCl 0.9%) or glycine 1.5% solution for distension of the vagina and clearing the view. The lubricated hysteroscopy is gently inserted through the vaginal orifice with one hand while the other hand softly compresses the vulvar tissue around the hysteroscope in order to prevent fluid leakage. The diagnostic procedure requires less than 2 min and the child can be discharged after 2 h [18]. Additional equipment, such as forceps used to remove foreign objects, facilitate simultaneous therapeutic management, eliminating the cause of complaints.
The necessity of sedation, or even general anesthesia, should always be considered individually based on the age of the patient and taking into account the possibility of psychological injury. For younger children, vaginoscopy under general anesthesia might be the preferred method; however, it can be used as an office-based procedure without anesthesia in virginal teenage girls.

The yield of the procedure was shown to be as high as 36% of the cases with abnormal findings at the time of vaginoscopy performed for abnormal bleeding, prolonged vaginal discharge and suspected anomalies [19].

Abnormal appearance of genitalia or suspected vaginal malformation should be explored by vaginoscopy. The diagnosis transverse vaginal septum is based upon direct visualization. This procedure facilitates precise evaluation of type and localization of the septum. The diagnosis of a complete septum obstructing menstrual blood flow is an indication of early resection of the septum. In case of a partial septum, it is possible to postpone the procedure until the initiation of sexual activity, as the septum has to be removed only when the disorder causes dyspareunia. In case of uterine malformations such as bicornuate or septate, it is recommended to postpone the surgery until fertility desire [20].

The safety, easy implementation and high efficiency of vaginoscopy place it as a useful procedure in the evaluation of vaginal disorders.

**Laparoscopy**

Laparoscopy, although invasive, still remains the ‘gold-standard’ diagnostic tool for many pelvic organ disorders, and is often used for final diagnosis and provision of treatment as a ‘see and treat’ procedure.
Endometriosis

Even though suspicion of endometriosis is based upon clinical presentation adjunct to physical signs and imaging findings, laparoscopy still remains the most reliable diagnostic modality.

The final diagnosis of endometriosis is histological confirmation through surgical biopsy. Once the abdomen is entered, a careful systematic evaluation of the pelvic and abdominal cavities should be done. A stepwise approach begins with exploring the anterior cul the sac followed by the ovarian fossae and the posterior cul de sac. The uterosacral ligaments should be carefully inspected for fibrosis tethering and asymmetry. Once the pelvis is evaluated, attention is then turned to the abdominal cavity [21].

Evaluation of the peritoneal surfaces is performed by filling the pelvic cavity with saline solution (NaCl 0.9%) and bringing the immersed laparoscope close to the surface, looking for any irregularities such as small clear papules and red lesions (typical in adolescents) [22] (fig. 9).

Diagnosis of endometriosis should not be delayed as it postpones symptomatic relief and may also endanger the patient’s future fertility and allow the disease to progress.

Pelvic Inflammatory Disease

Laparoscopy plays a role in the diagnosis and treatment of this devastating condition. The early diagnosis of pelvic inflammatory disease is key to reducing the sequelae of this infection. In situations where clinical diagnosis is difficult, laparoscopy can be helpful [21].

Adnexal Mass

Laparoscopic diagnosis of adnexal masses has been found to be reliable, with a sensitivity of 100% for diagnosis of malignancy. The majority of benign ovarian neoplasms
could be managed by means of laparoscopy as well as chosen cases of malignant tumors.

**Ovarian Torsion**

Sonography is not reliable in the diagnosis or exclusion of ovarian torsion. Thus, a strategy of earlier and liberal use of diagnostic laparoscopy, particularly with characteristic clinical presentation and a pelvic mass of approximately 5 cm, may improve ovarian salvage. Because pathology is predominantly benign, the edematous detorsed ovary is safe to salvage [23].

**Müllerian Malformations**

The prompt diagnosis and treatment of obstructed uterovaginal or uterine duplication malformations is crucial. Those patients may develop endometriosis from retrograde menstruation as a result of delayed diagnosis and jeopardize their future fertility performance.

Another malfunction diagnosed and treated by means of endoscopic techniques is an asymmetric bicornuate uterus with an obstructed uterine horn. In case of the obstruction and clinical symptoms connected to menstrual blood retention, it is recommended to surgically remove the obstructed horn [24].

The variety of imaging modalities used to demonstrate genital organs of the child and adolescent can bring the physician to the appropriate diagnosis and treatment.

**References**


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