Abnormalities of Female reproductive organs has been a matter of concern in females of reproductive age. These abnormalities can be congenital or acquired. Environmental or genetic anomalies can result in congenital abnormalities in female organs of infants. Acquired abnormalities imply infections, physical damage brought during delivery or surgery or hormonal imbalances as their etiology. Amenorrhea and infertility are the important representing symptoms of these abnormalities. Diagnosis and identification of abnormalities such as adenomyosis, uterine fibroids, etc. along with their exact location establishes the accurate treatment procedures.

Hymenal Atresia (Imperforate Hymen)

Definition and etiology of hymenal atresia
Imperforate hymen is a rare congenital malformation characterized by the failure of distal canalization of the vaginal plate at the junction between the urogenital sinus and the vagina. An imperforate hymen results in a complete occlusion of the outflow from the female genital tract.

Patients are usually asymptomatic until puberty. At puberty, there is primary amenorrhea accompanied by abdominal pains, which occur at monthly intervals and are called menstrual molimina. The pains are the result of a build-up of menstrual blood in the vagina (hematocolpos) which cannot drain away due to the atresia of the hymen. As the condition develops, blood can also collect in the uterus (hematometra) and in the fallopian tubes (hematosalpinx). Additionally, there can be micturition and defecation as well as flatulence. Some cases of the imperforate hymen can present during the neonatal period. The typical presentation of imperforate hymen during the neonatal period includes a whitish bulging mass filling the vaginal introitus, ectrodactyly, and the presence of other genitourinary tract anomalies.

Diagnosis of hymenal atresia

Many patients visit doctors due to an absence of menstruation during puberty. A diagnosis can be achieved by a gynecological and sonographic investigation. The hymen can be seen to be distended and lividly colored due to the blood collecting behind it. Additionally, hematocolpos can be detected as a large swelling using a digital rectal examination and can be visualized via ultrasound. Hematometra and hematosalpinx can also be observed via ultrasound.

Treatment for hymenal atresia

The treatment of an imperforate hymen is hymenectomy. A transverse incision is made in the hymen with subsequent digital expansion. As a prophylaxis, antibiotics should be administered before the procedure.
Breast Abnormalities

Polythelia and polymastia

Polythelia presents with additional nipples which lie along the mammary ridge. The mammary ridge is formed during embryonic development but normally regresses afterward.

Due to incomplete regression, polythelia can develop, although it is not classed as a disease. The various forms include:

- **Polythelia completa**: Areola and nipple (mammilla) form on the axilla or below the mammary.
- **Polythelia mamillaris**: Areola which lies within or outside of the mammilla.
- **Polythelia areolis**: Areola without a nipple.

**Note:** Familial polythelia might be associated with an increased risk of kidney and urinary tract malformations, certain cancers, and Becker nevus.
mammary ridge. The differences lie between accessory breast tissue (mamma aberrata), in which only gland tissue is affected, and polymastia completa, where in addition to extra glandular tissue, there are also areola and nipples present. This form, also known as mamma accessoria, is much rarer.

The mammary gland is a soft bulge of tissue, most often felt in the area of the axilla or the vulva. It can swell premenstrually, during pregnancy or during the lactation period, which can be painful and can also lead to plugged milk ducts and result in mastitis. In addition to this, a degeneration of the ectopic tissue is possible, in which case the operative removal of the excess mammary tissue should be strongly recommended as a therapeutic option.

A missing nipple is known as athelia and a missing breast is termed amastia.

**Macromastia and Micromastia**

Macromastia (sometimes also known as gigantomastia) describes an excessive hypertrophy of the breast tissue.

Patients suffer from psychological stress in addition to physical complaints. The weight of the breasts can lead to neck and back pain, as well as postural problems. A breast reduction via plastic surgery is a possible operative strategy.

The opposite of this condition is micromastia. This is a hypoplasia of the breast. There are numerous possible causes for this condition, ranging from genetic disposition such as congenital disturbances in sexual development (i.e., Ullrich-Turner syndrome), to psychiatric diseases such as anorexia nervosa. If there is considerable psychological distress, breast enlargement (augmentation plastic surgery) is an option.
Common uterine abnormalities

1. Uterine fibroids (Leiomyoma)
2. Adenomyosis
3. Endometrial thickening

Uterine fibroids

A uterine fibroid is a **heterogeneous hypoechoic mass arising from the uterine myometrium**. A fibroid that progressively enlarges in size or is greater than 8 cm should be considered suspicious for a sarcoma and an MRI should be performed to help differentiate.

- Benign tumors of the smooth muscle cells of the uterus
- Very common during reproductive years
- Mostly asymptomatic but can cause pain, menorrhagia, and **infertility**
- Imaging findings: hypoechoic mass, possible calcifications, may have cystic components or fat
- Location: submucosal (bleeding and infertility), intramural, subserosal (mass effect on adjacent structures)

Adenomyosis

- Presence of heterotypic endometrial stroma within the myometrium
- Clinical presentation often reveals **dysmenorrhea** or menorrhagia
- Imaging findings: enlarged uterus, myometrial cystic spaces, widened posterior uterine wall on ultrasound, best visualized on ultrasound and MRI

Endometrial thickening

<table>
<thead>
<tr>
<th>Focal</th>
<th>Diffuse</th>
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<tbody>
<tr>
<td>• Polyp</td>
<td>• Normal secretory phase</td>
</tr>
<tr>
<td>• Endometrial carcinoma</td>
<td>• Endometrial hyperplasia</td>
</tr>
<tr>
<td>• Submucosal fibroid</td>
<td>• Endometrial carcinoma</td>
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Endometrial thickening is difficult to distinguish based on imaging alone. A sonohysterogram is helpful in differentiating focal from diffuse and in localizing a focal lesion.

Endometrial atrophy occurs in postmenopausal women due to lack of hormonal stimulation. The endometrium is found to be less than 4 mm. It is the second most common cause of postmenopausal bleeding.

Types of uterus abnormalities

Abnormalities of the uterus **occur as a result of the disrupted fusion of the Mullerian ducts during development**. Based on the time period when the incomplete fusion occurs, the resultant clinical pictures have a range of severity:

- **Arcuate uterus**: Least serious form where there is a concave contour towards the fundus.
- **Subseptate uterus**: Externally normally shaped, however, there is a projection of the medial septum causing a partial separation of the uterus.
- **Septate uterus**: Externally normally shaped, however, there is a projection of the medial septum that completely divides the uterus internally.
- **Uterus bicornis unicollis**: Two uterus bodies, one cervix.

- **Uterus bicornis bicollis**: Two uterus bodies, two cervixes.
- **Duplex uterus (uterus didelphys)**: Most serious form; there are two uteri, two cervixes, and two vaginas.
- **Unicornuate/bicornuate uterus**: Rudimental horn formation as a result of the incomplete development of one of the müllerian ducts and incomplete formation of the other.
Image: “Comparison of three-dimensional ultrasound and HSG imaging in cases of uterine malformation using AFS: A. Normal uterus, B. Unicornuate uterus, C. Arcuate uterus, D-G. Different subtypes of septate uterus (partial to complete septum), H. Bicornuate uterus, I. Didelphys.” by Openi. License: CC BY 2.5

Note: Abnormalities of the uterus usually accompany abnormalities of the vagina, the kidneys, and the efferent urinary tracts!

Symptoms, diagnosis, and therapy of uterine abnormalities
Abnormalities of the uterus can lead to abortions, abnormal fetal position, birth complications, premature birth, dysmenorrhea, and sterility.

A number of imaging procedures can be used to achieve a diagnosis: sonography, endoscopy, and hysterosalpingography (contrast X-rays of the uterus and fallopian tubes). These should precede a clinical examination with inspection and palpation.

Treatment can be done by the hysteroscopic separation of the septum in a single (sub)septate uterus, or in the case of a bicornuate uterus, the surgical separation of the septum with the subsequent unification of the two halves of the uterus (Strassmann’s operative procedure).

**Mayer-von-Rokitansky-Küster-Hauser Syndrome**

In Mayer-von-Rokitansky-Küster-Hauser syndrome, the uterus is only rudimentary developed (uterine aplasia). Additionally, there is hypoplasia or aplasia of the vagina, while the ovaries develop normally and therefore fulfill their hormonal function.
The abnormality develops in approximately the second embryonic month. Those affected have a female gonadal sex and a female chromosomal sex (46, XX) and are normally symptom-free until they reach puberty. At this point, the leading symptom is primary amenorrhea. Additionally, there can be difficulties with intercourse. Due to the uterus only having a rudimentary form, the patient is infertile.

This syndrome often arises in combination with abnormalities in the urinary system (e.g., renal agenesis, ectopic kidneys).

10 % of women who suffer from primary amenorrhea are diagnosed with Mayer-von-Rokitansky-Küster-Hauser syndrome. This can be diagnosed through clinical examination and with the aid of various imaging procedures (e.g., MRI., see images).

This condition can be surgically treated by creating an artificial vagina (neovagina), allowing the patient to lead largely normal lives as women, including being able to carry out sexual intercourse. The sterility cannot be treated, however.
Review Questions

The answers can be found below the references.

1. **Which symptom or finding is not typical of hymenal atresia?**
   
   A. Hematocolpos  
   B. Amenorrhea  
   C. Hematosalpinx  
   D. Hemothorax  
   E. Hematometra  

2. **Which of the following abnormalities does not accompany an abnormality of the uterus?**
   
   A. Polythelia  
   B. Uterus bicornis unicollis  
   C. Mayer-von-Rokitansky-Küster-Hauser syndrome  
   D. Arcuate uterus  
   E. Uterus didelphys  

3. **Which statement is true? Mayer-von-Rokitansky-Küster-Hauser syndrome...**
A. ...is accompanied by karyotype 46, XY.
B. ...can be accompanied by abnormalities of the urinary system.
C. ...is diagnosed in 1% of all women who suffer from amenorrhea.
D. ...can be treated with neovaginal surgery, which leads to a regression of the sterility.
E. ...has the lead symptom that the patient has difficulties in having intercourse.

References


*Correct answers:* 1D, 2A, 3B

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