

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

مقام معظم رهبری:

برای خدمت رسانی بهتر به

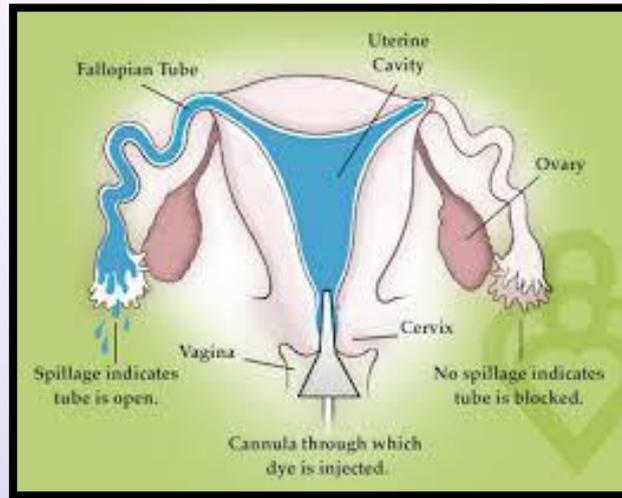
مردم،

کارهای دقیق پژوهشی

لازم است!



Hysterosalpingography



Dr Ahamdi, MD, Radiologist

**Department of Reproductive Imaging
Royan Institute, Tehran-Iran**

Introduction

- ❖ Hysterosalpingography is the radiographic evaluation of the uterine cavity, and fallopian tube after injection of a radio-opaque medium through the cervical canal.
- ❖ Hysterosalpingography was performed as early as the 1920s, when one of the indications for the examination was pregnancy!! (*Miller et al, 1928*)
- ❖ Although hysterosalpingography has been used over the years for various indications, evaluation of infertility is the most common reason for its use today.

Introduction (Continued)

- ❖ It is indicated in the early evaluation of the infertile couple and provides detailed information about the uterine cavity, tubal patency, lesions, congenital anomalies and different types of intrauterine defects.
- ❖ The other advantages of HSG for infertile couples is the therapeutic effect of the procedure. Several studies demonstrated that after a normal HSG finding, the infertile patients has a 30% chance to conceive spontaneously within the first 3 months (Hosbach 1973; Alper 1986; Rasmussen 1991) .

Introduction (*Continued*)

- ❖ The technique of HSG is quite simple, less invasive, more convenient, and provide reliable information at less cost.
- ❖ Despite the varied diagnostic options such as hysteroscopy and laparoscopy, hysterosalpingography is still an important and complementary examination in the early evaluation of infertility.

Indication

- Routine infertility evaluation (primary and secondary)
- Congenital abnormalities:
 - Primary diagnosis
 - Following reconstructive surgery
- Repeated abortions
- Intrauterine adhesions (Asherman's syndrome)
- Post uterine evaluation
 - Myomectomy (pre- and post)
 - Adhesiolysis
 - Caesarean section

Indication (Continued)

- Tubal surgery(*pre- and postoperative*)
 - *Sterilization*
 - *Reversal of sterilization*
 - *Reconstructive tubal surgery*
- Incompetent cervical os
- Locating lost IUD (*after ultrasound*)
- Abnormal uterine bleeding
- Secondary amenorrhea
- Tumor staging of endometrial carcinoma

Contraindication

- ✓ Pelvic inflammatory disease with abdominal tenderness or palpable mass
- ✓ Recent uterine and tubal surgery
- ✓ Active uterine bleeding
- ✓ Pregnancy
- ✓ Hypersensitivity to the contrast medium

○ *Proper timing*

The procedure should be scheduled during the proliferative phase, **2-5** days after cessation of a menstrual flow, to avoid early pregnancy .



Equipment & instruments

-Radiology system with fluoroscopy

-Contrast Media: water-soluble contrast media is widely used, such as “Visipaque”, or “Iopaque”, etc.

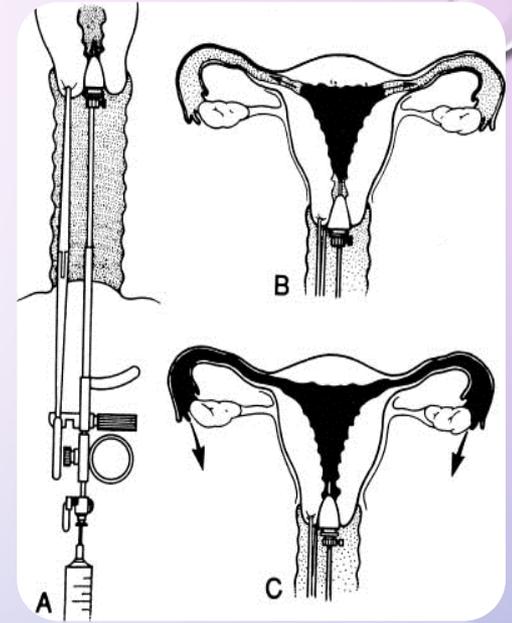
- A sterile set of instruments





Technique of examination

1. Injecting a mild sedative (IM)
2. Litotomy positioning
3. Washing Perinea & vagina
4. Appropriate speculum is inserted
5. Jarcko or catheter insertion into the cervical canal
6. Fixation of jarcko/catheter
7. Exclusion of the “guide” part and injecting contrast media gently by 10cc syringe
8. Taking at least 4 images under fluoroscopic guide



○ *Advantages of using catheters*

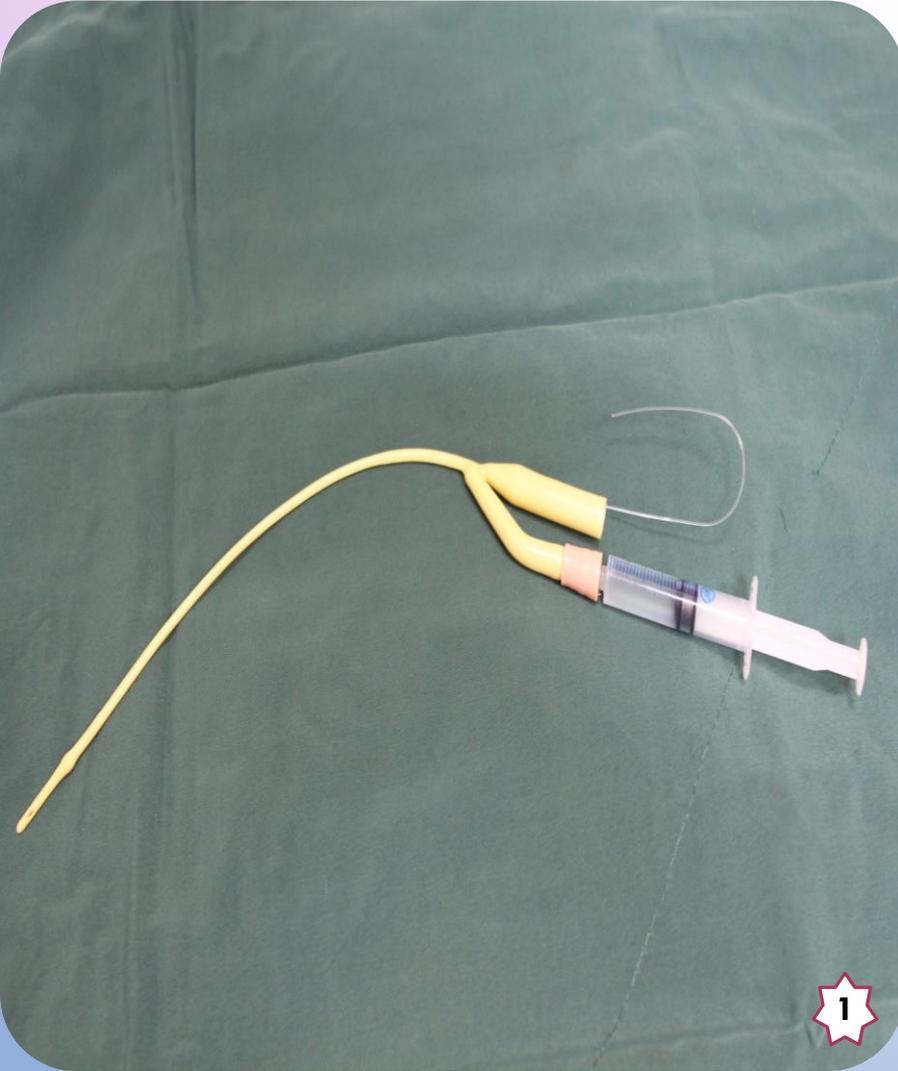
- ✓ It eliminates the need for the use of tenaculum and thus avoids associated bleeding & discomfort.
- ✓ Exclusion of speculum after first injection of contrast
- ✓ Easy positioning of the patient during the procedure
- ✓ Appropriate for multiparous women
- ✓ Appropriate for women with long septum or women with two external os.
- ✓ Appropriate for retroverted or lateroverted cervixes
- ✓ Good quality images

Limitations of using catheters

If you can't insert the catheter within the cervix appropriately, the "isthm" will not be distinguishable

Introduction of intrauterine artifacts

Inability to manipulate the uterus if it is retroverted or anteverted





1. Normal HSG by Jarcho method



2. Normal HSG by Foley catheter method

The background features a vertical gradient from light purple at the top to light blue at the bottom. Numerous water droplets of various sizes are scattered across the frame, with some appearing in the top-left and bottom-right corners, and others more centrally located. The droplets have a realistic, glossy appearance with highlights and shadows.

Technical problem



Malposition of speculum



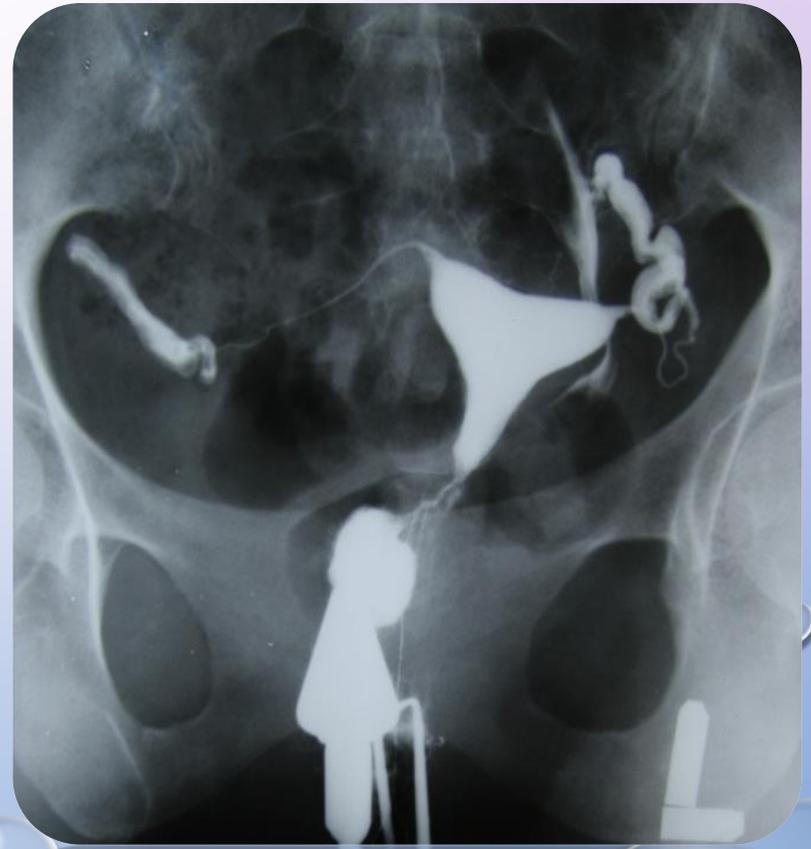
*Misdiagnosis of didelphys, complete
bicornuate or septate*

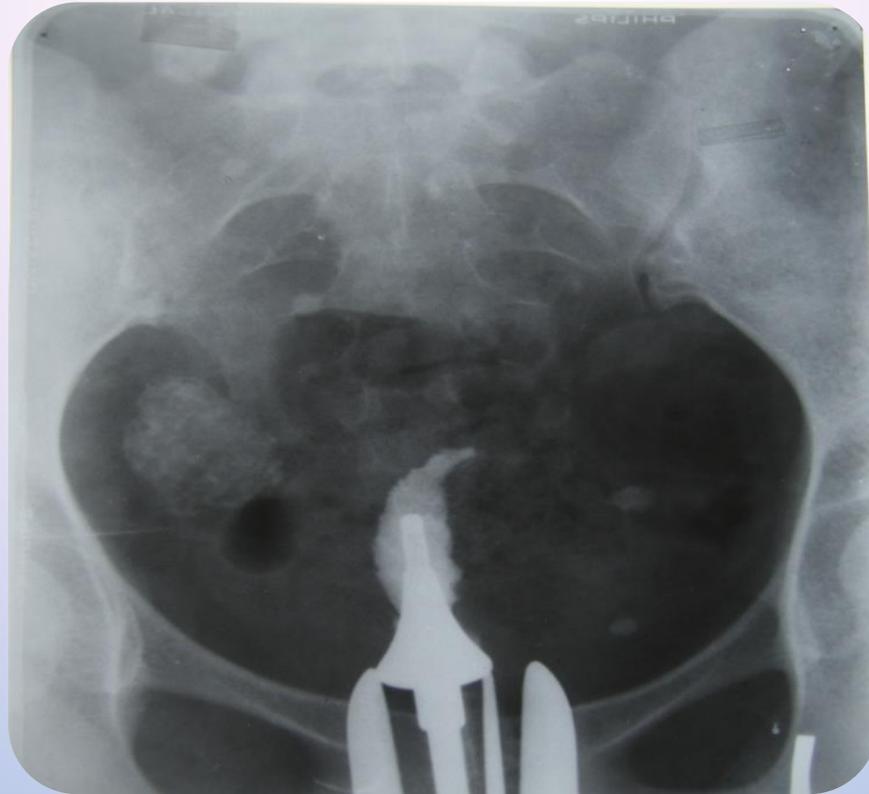










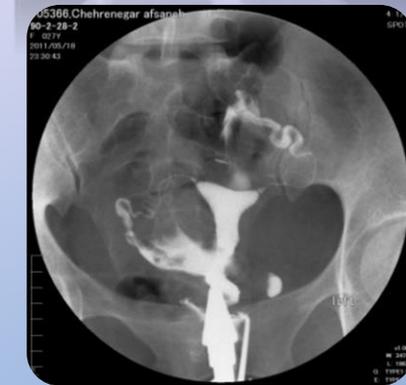




➤ *Non Patological Filling defect*

➤ *Air bubbles*

➤ *Mucous pluge*



➤ ***Lake Of Tubal Filling :***

- ***Technical Problem***
- ***Corneal Spasm***
- ***Mucous Plaque***



Intravasation

- ✓ Uterine scarring
- ✓ Tubal obstruction
- ✓ Recent uterine surgery
- ✓ Intrauterine synechiae
- ✓ Uterine anomalies
- ✓ Misplacement of cannula
- ✓ Excessive injection pressure



Complications

- ▶ Pain
- ▶ Bleeding
- ▶ Venous and lymphatic intravasation of contrast media
- ▶ Vasovagal reaction
- ▶ Acute pelvic infection
- ▶ Contrast media complication
- ▶ Radiation exposure
- ▶ Uterine perforation

Interpretation

Principles in interpretation of HSG are:

- Dividing the images of the whole internal genital organ into endocervix, Uterine cavity and tubal lumen and patency.
- Investigating the images of each part regarding these aspects; size or shape or border, filling defect or irregularity and spillage or collection of medium.

Abnormal HSG findings and differential diagnosis:

- ✓ Endocervix
- ✓ Uterus
- ✓ Uterine tubes



Endocervix

Narrowing normal variant, DES exposure, post operative, neoplasm

Dilatation normal variant, incompetent os, postoperative

Filling defects air bubble, mesonephric remnant, synechiae, neoplasm

Irregularity normal variant, diverticulum, perforation, neoplasm



Uterus

Size Small

hypoplasia, nulliparity, DES exposure, synechia

Large

multiparity, pregnancy, molar pregnancy, neoplasm

Shape

arcuate uterus, septate uterus, unicornuate uterus, bicornuate uterus, congenital abnormalities DES exposure, synechia, neoplasms, postoperative

Filling defect

congenital fold, air bubble, blood clot, mucoid material, polyp, pseudo adhesions, leiomyoma, synechia,

Irregularities

Adenomyoma, septate uterus, IUD, postoperative, endometrial, carcinoma, pregnancy, molar pregnancy, retained conceptus, synechia, DES exposure, intravasation, neoplasm, normal variant-endometrial hyperplasia, adenomyosis, tuberculosis, postoperative, embedded IUD, uterine fistula, Garthner's duct remnant

Uterine tubes

**Absent
Visualization**

Technical, corneal spasm, mucosal plugging, obstruction
postoperative

**Partial
visualization**

Technical postoperative, obstruction, congenital

Dilatation

Obstruction(hydrosalpinx), peri-fimberial adhesion, tubal pregnancy

Filling defect

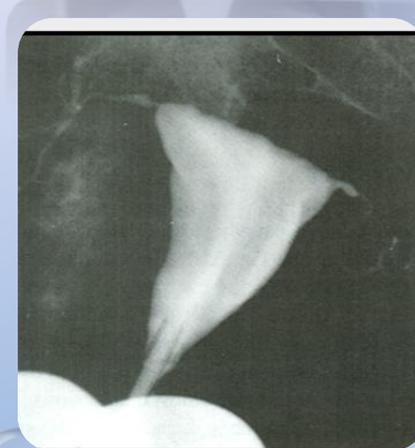
Air bubble, polyp, neoplasm, silicone implants, tubal pregnancy

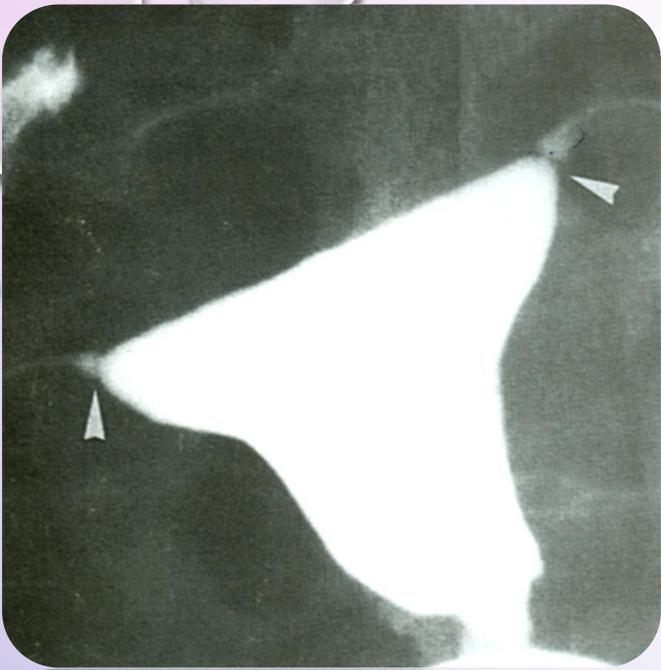
Irregularity

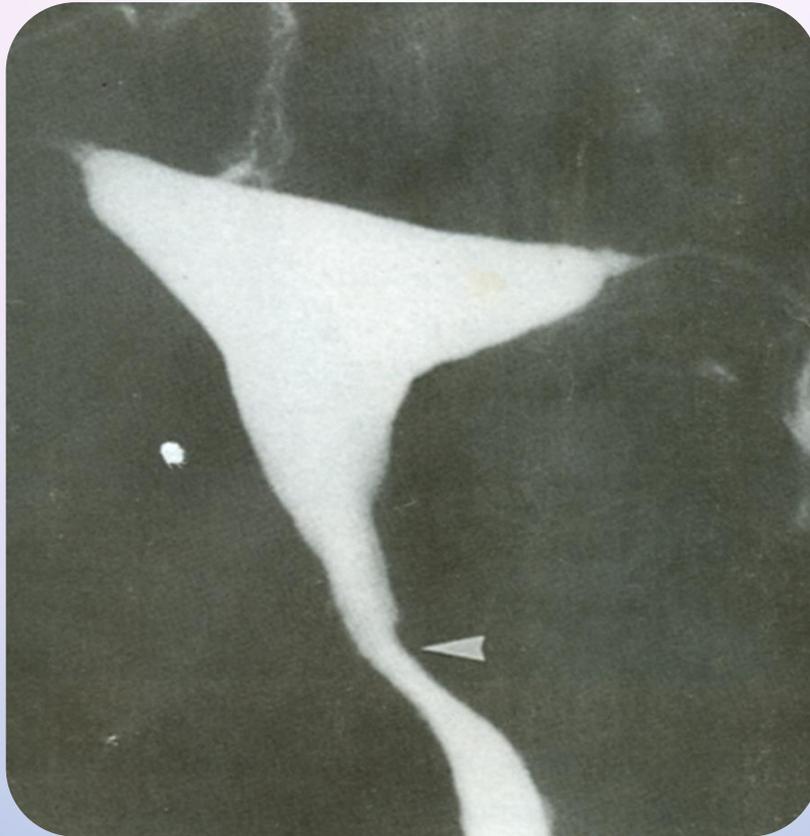
Salpingitis isthemia nodosa, tubal diverticula, tuberculosis,
endometritis, postoperative

Normal HSG

- ✓ Inverted triangular uterine cavity without filling defect
- ✓ Normal fallopian tubal contour and diameter
- ✓ Bilateral spillage of contrast







**Normal HSG narrow uterine isthmus
(arrowhead)**





Pathological changes in the HSG:

■ Uterine pathology

- ✓ Congenital
- ✓ Acquired

■ Tubal abnormalities



Acquired Pathology

Polyp



Leiomyoma





Adenomyosis



Hyperplasia



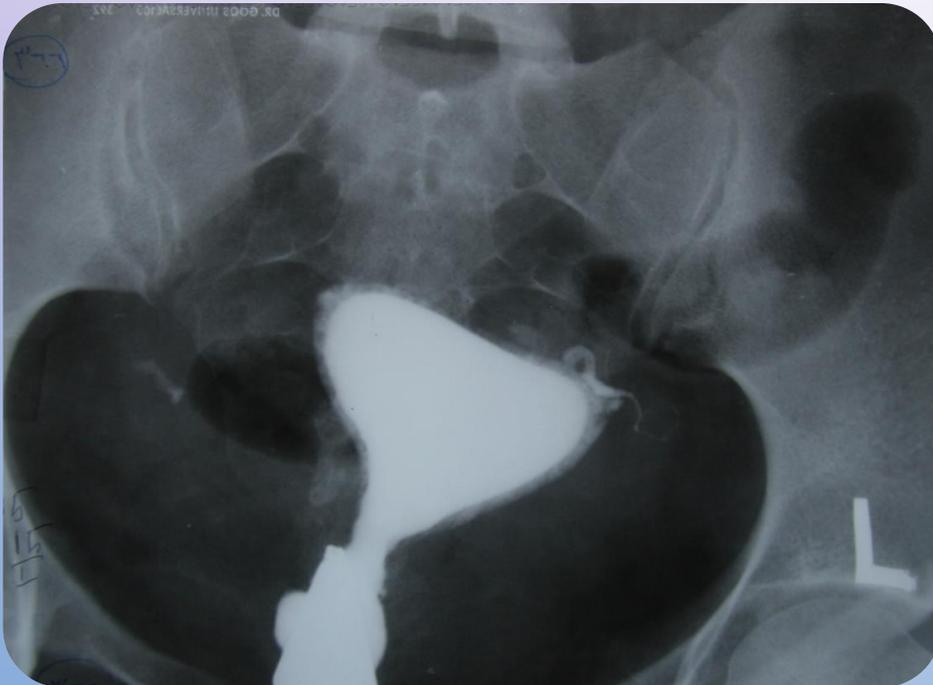
Synechia



Retained products of conception



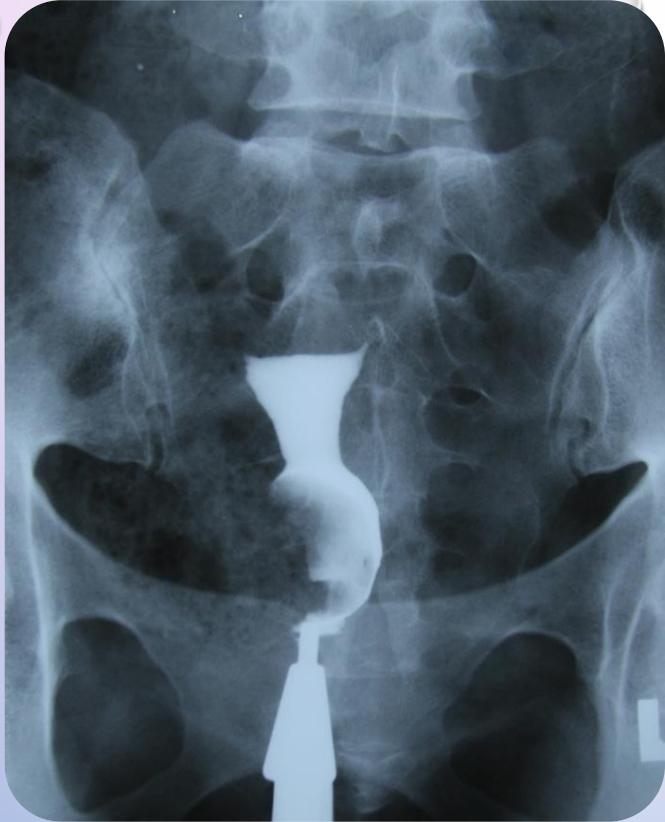
Pregnancy



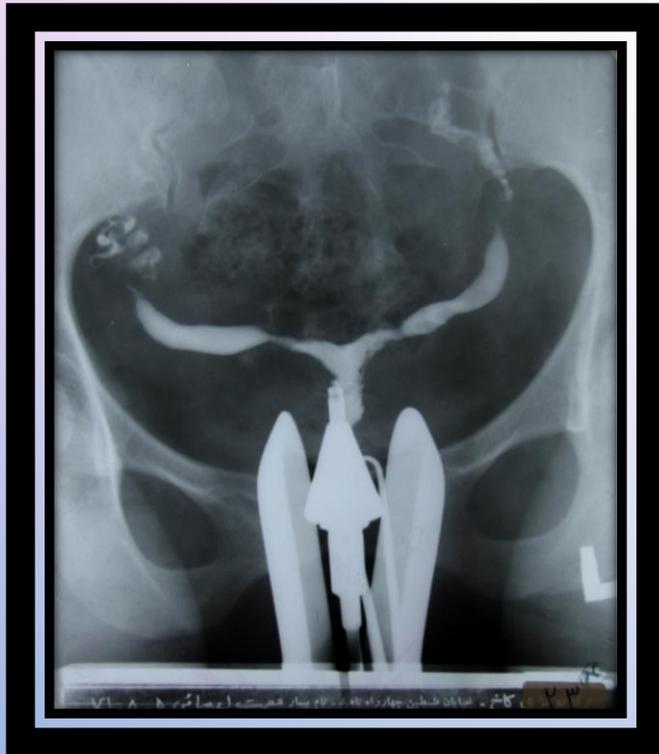


Cervix





Congenital Anomaly





ASRM müllerian anomalies classification 2021

Samantha M. Pfeifer, M.D., Marjan Attaran, M.D., Jessica Goldstein, R.N., Steven R. Lindheim, M.D., M.M.M., John C. Petrozza, M.D., Beth W. Rackow, M.D., Evan Siegelman, M.D., Robert Troiano, M.D., Thomas Winter, M.D., Andrea Zuckerman, M.D., and Sarah D. Ramaiah, M.S.Ed.

There are many proposed classification systems for müllerian anomalies, but the ASRM classification has been the most recognized and utilized. The advantage of this classification is its strong relation with clinical pregnancy outcomes. However, the ASRM classification excludes those of the vagina and cervix, and does not address other aberrations. Despite this classification and others, the wide variety of müllerian anomalies has many providers. Consequently, müllerian anomalies may require complex surgical interventions, and result in persistent issues such as recurrent pregnancy loss. The American Society for Reproductive Medicine Task Force on Müllerian Anomalies Classification set goals for a new classification and chose to base the classification on clinical recognizability, while expanding and updating it to include the latest evidence. This classification provides an opportunity to raise awareness of this area of medicine, educate the public, and inform the new American Society for Reproductive Medicine Müllerian Anomalies Classification (ASRM Müllerian Anomalies Classification, American Society for Reproductive Medicine.)

El resumen está disponible en Español al final del artículo.



DIALOG: You can discuss this article with its authors.

> [Radiographics](#). 2021 Oct;41(6):1857-1875. doi: 10.1148/rg.2021210022.

Müllerian Duct Anomalies: Role in Fertility and Pregnancy

Mark D Sugi¹, Rubal Penna¹, Priyanka Jha¹, Liina Pöder¹, Spencer C Behr¹, Jesse Courtier¹, Evelyn Mok-Lin¹, Joseph T Rabban¹, Hailey H Choi¹

Affiliations + expand

PMID: 34597219 DOI: 10.1148/rg.2021210022

Abstract

Müllerian duct anomalies (MDAs) have important implications for the reproductive health of female patients. In patients with both infertility and recurrent pregnancy loss, the incidence of MDAs is as high as 25%. Congenital uterine anomalies are often only part of a complex set of congenital anomalies involving the cervix, vagina, and urinary tract. Multiple classification systems for MDAs exist, each with different criteria that vary most for the diagnosis of septate uterus. Recognizing the features that guide clinical management is essential for interpretation. Identification of an MDA should prompt evaluation for associated urinary tract anomalies. In patients with infertility who seek to use assisted reproductive technologies such as intrauterine insemination, recognition of MDAs may have an affect on reproductive success, particularly in patients who have an incomplete and clinically occult septum that divides the cervix. Two-dimensional US is the first-line modality for evaluating the uterus and adnexa. Three-dimensional (3D) US or MRI may help to visualize the external uterine fundal contour and internal indentation of the endometrial cavity, which are two morphologic

Congenital Uterine Malformation by Experts (CUME): better criteria for distinguishing between normal/arcuate and septate

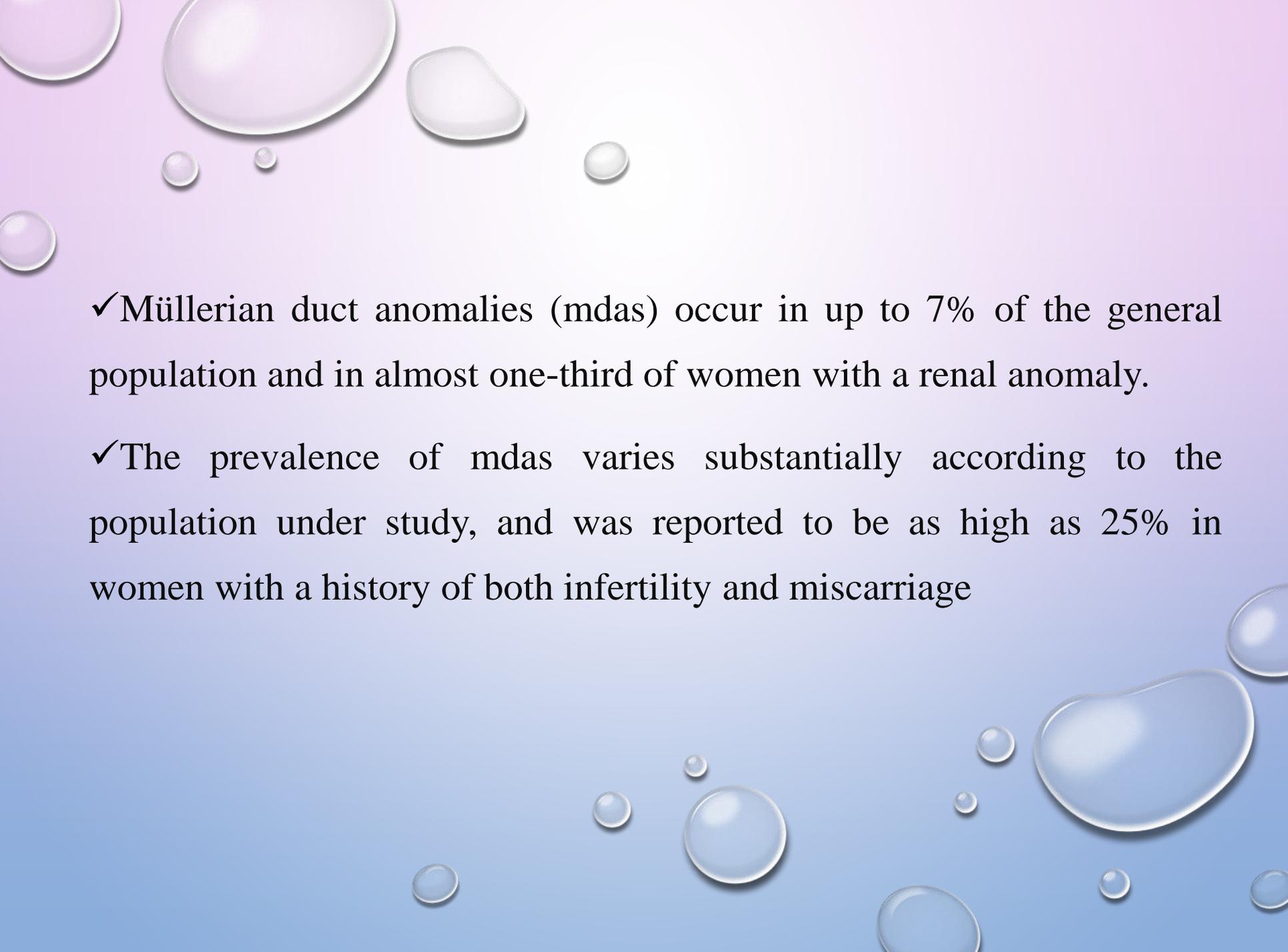
The ESHRE/ESGE consensus on the classification of female genital tract congenital anomalies^{†‡}

Grigoris F. Grimbizis^{1,2,*}, Stephan Gordts¹, Attilio Di Spiezio Sardo¹, Sara Brucker¹, Carlo De Angelis¹, Marco Gergolet¹, Tin-Chiu Li¹, Vasilios Tanos¹, Hans Brölmann¹, Luca Gianaroli¹, and Rudi Campo¹

¹Congenital Uterine Malformations (CONUTA) common ESHRE/ESGE Working Group, ESGE Central Office, Diestsevest 43/0001, 3000 Leuven, Belgium ²First Department of Obstetrics & Gynecology, Aristotle University of Thessaloniki, Tsimiski 51 Street, Thessaloniki 54623, Greece

*Correspondence address. First Department of Obstetrics & Gynecology, Aristotle University of Thessaloniki, Tsimiski 51 Street, Thessaloniki 54623, Greece. E-mail: grimbiz@med.auth.gr; grigoris.grimbizis@gmail.com

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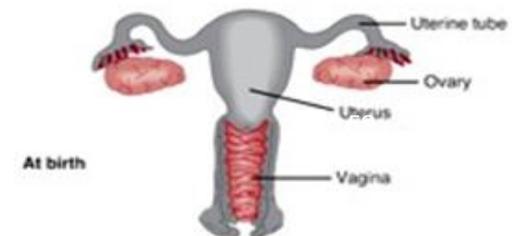
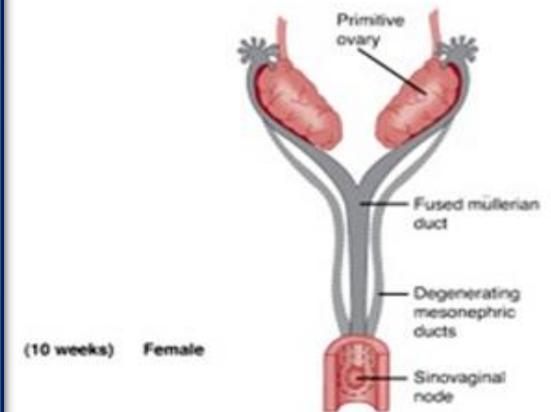
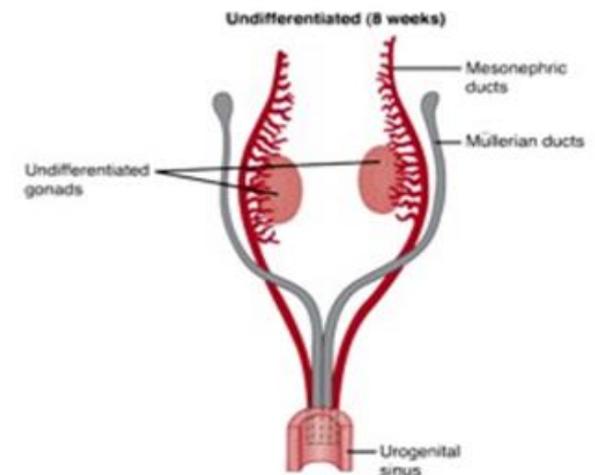
- 
- ✓ Müllerian duct anomalies (mdas) occur in up to 7% of the general population and in almost one-third of women with a renal anomaly.
 - ✓ The prevalence of mdas varies substantially according to the population under study, and was reported to be as high as 25% in women with a history of both infertility and miscarriage

❖ Pathogenesis

Normal Development:

-The uterus, cervix and uterine tubes are developed from a pair of Mullerian (paramesonephric) ducts during the 6th week of gestation.

- Lack of male sexual hormones at this time leads to resorption of mesonephric ducts and development of paramesonephric ones to form female genital tract.

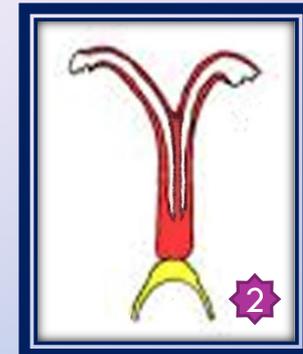


▪ ***Normal development is related to the improvement of three phases:***

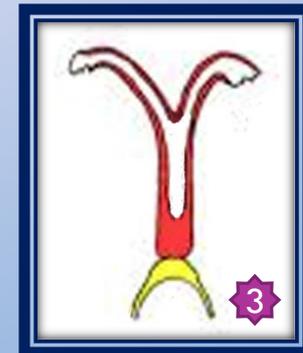
1. *Organogenesis*: formation of both Mullerian ducts

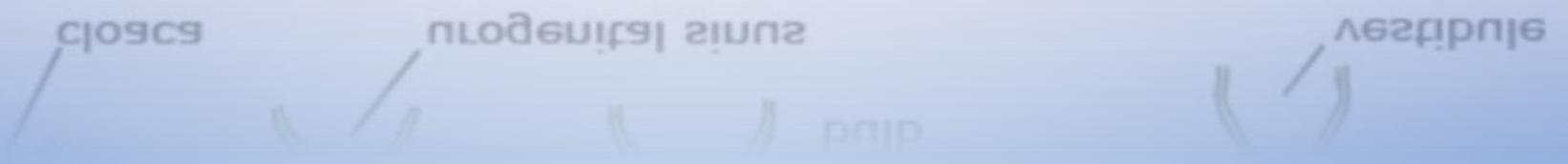
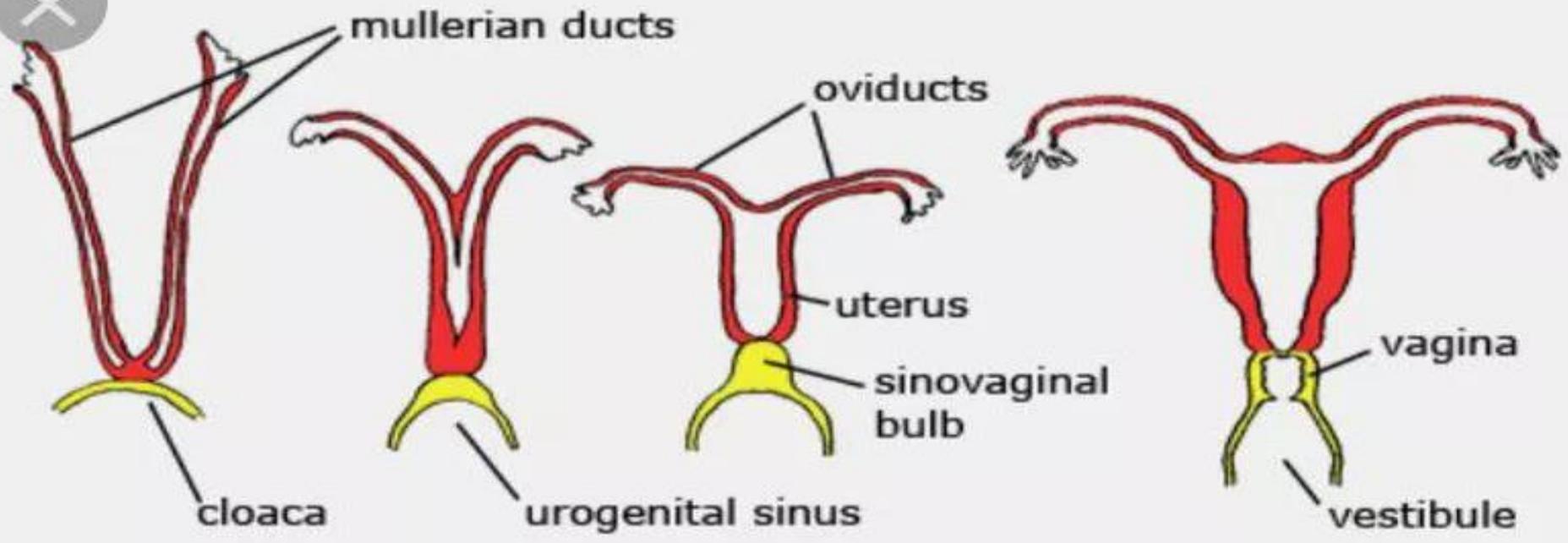


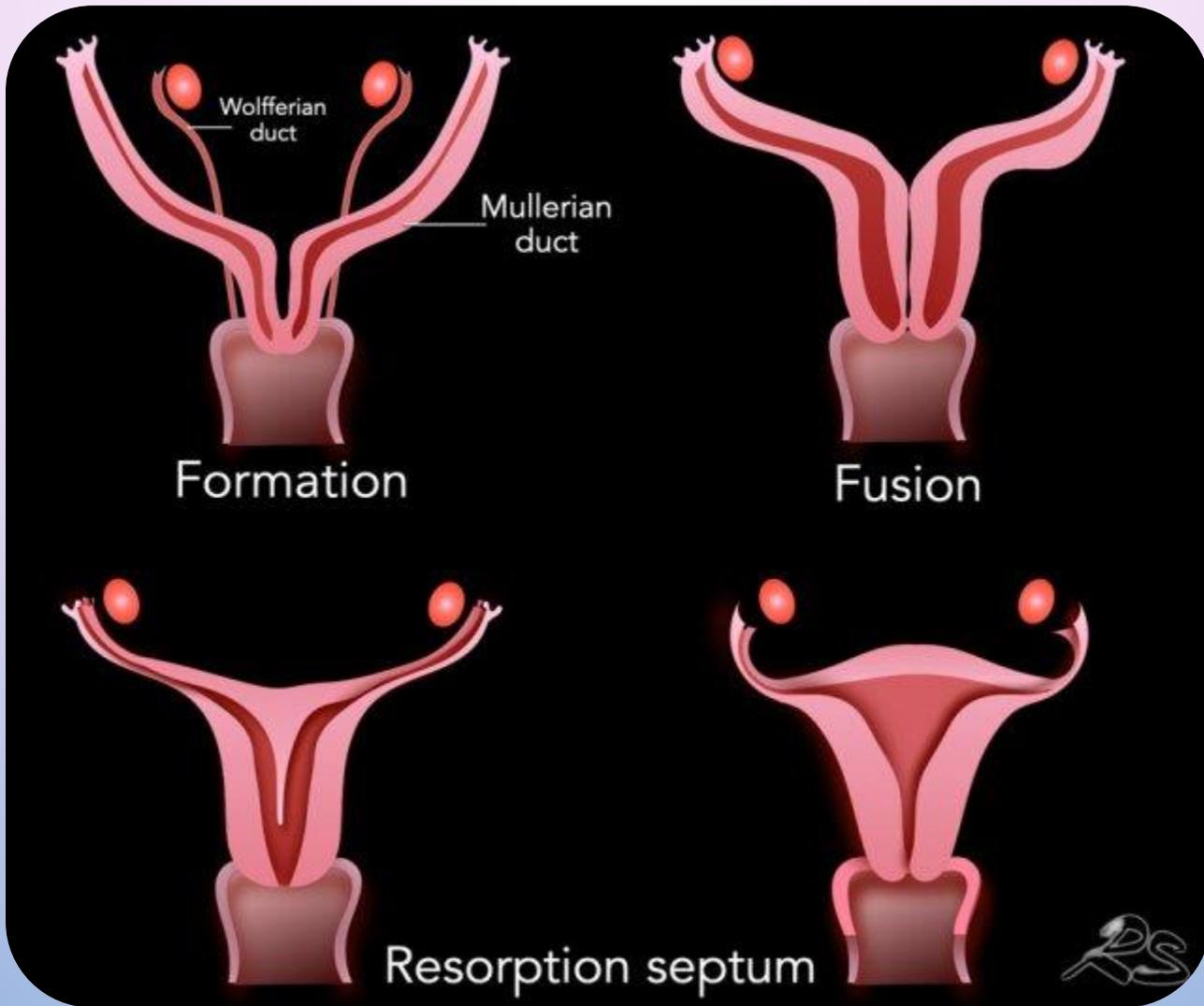
2. *Fusion*: fusion of both the ducts to form the uterus



3. *Septal Resorption*: subsequent resorption of the central septum, once the ducts have fused.







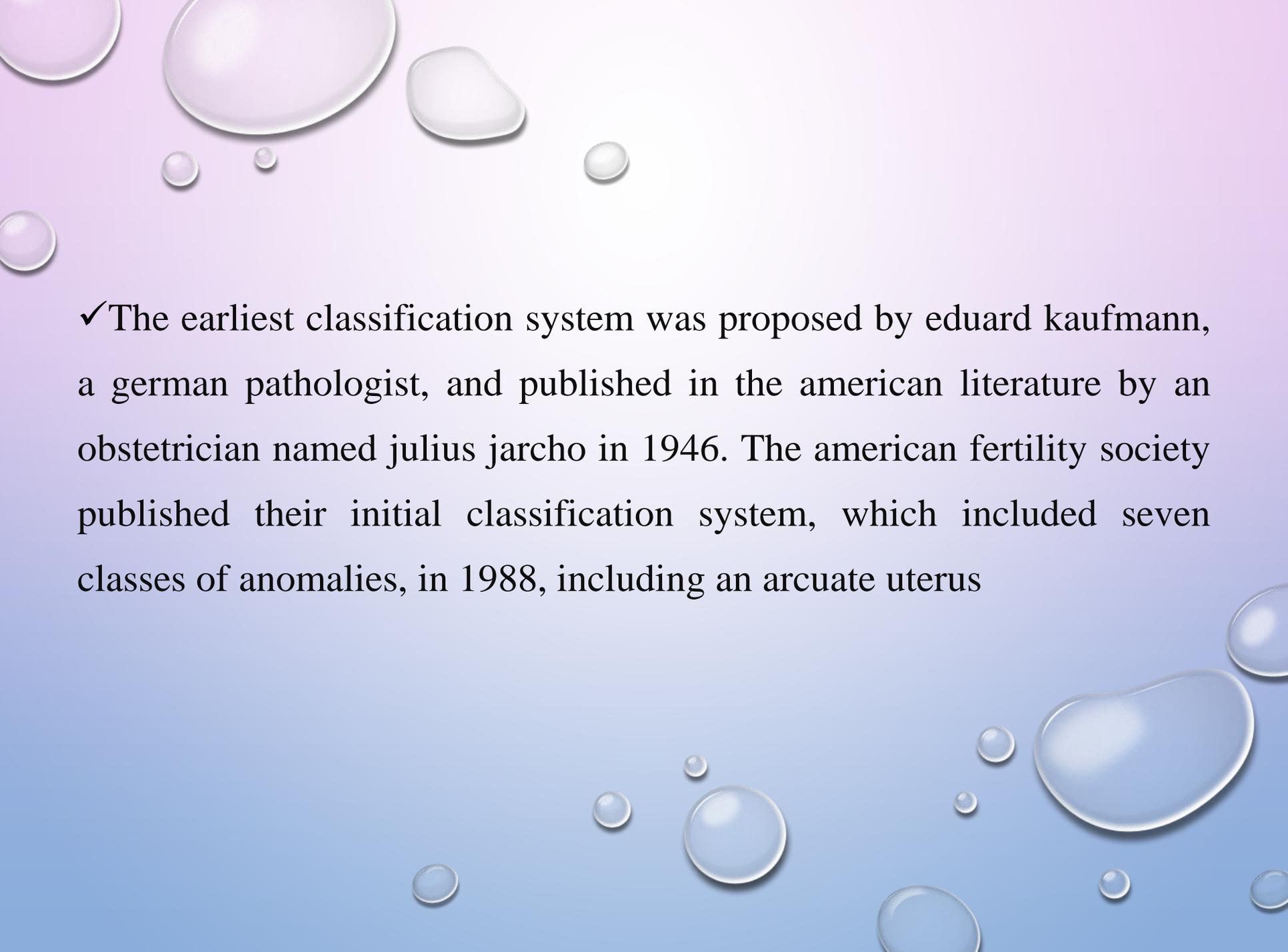
Resorption septum

❖ **Clinical presentations and complications**

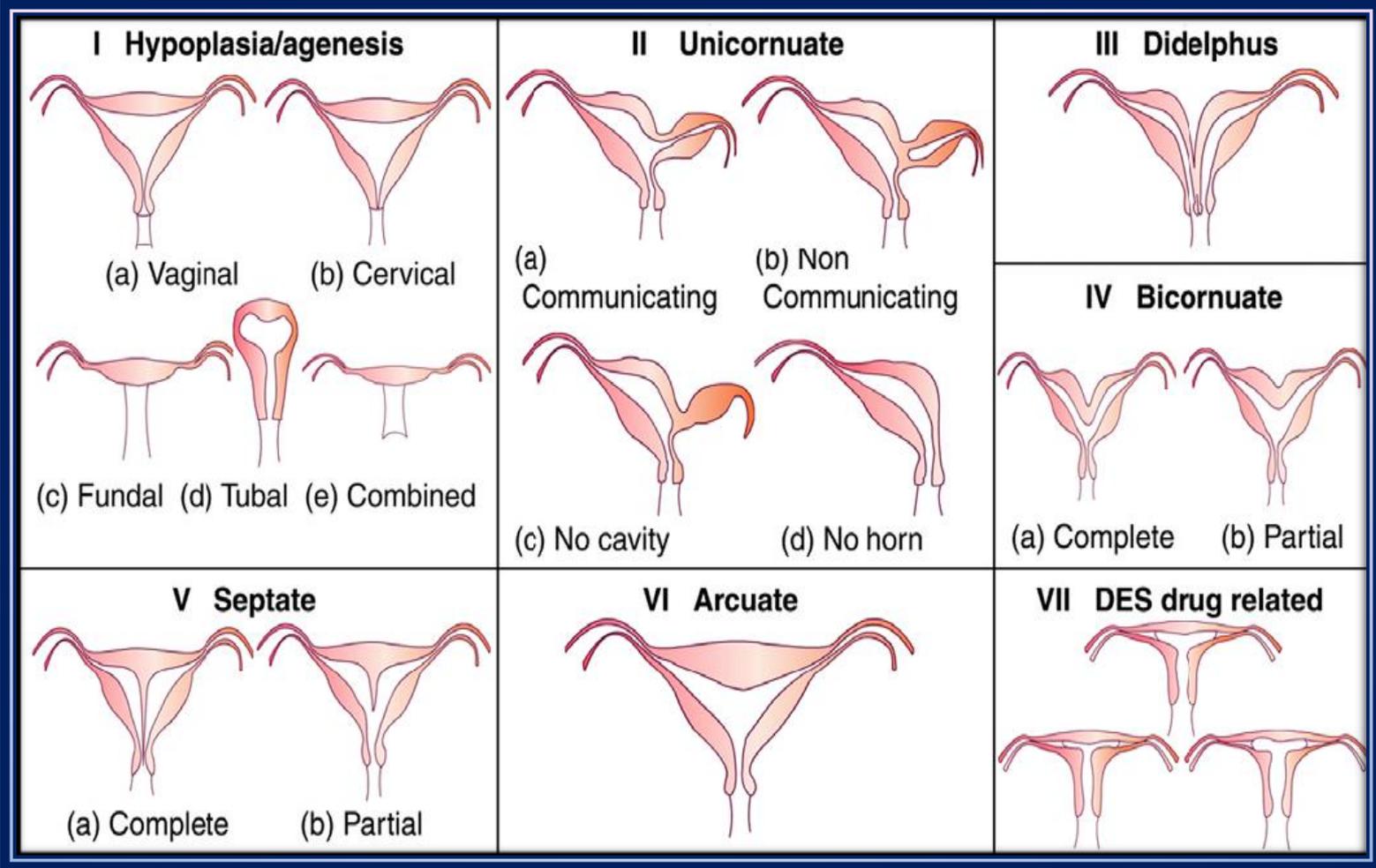
***dependent on the type of anomaly*:**

- asymptomatic (usually in arcuate and subseptate uterus)
- higher incidences of infertility
- recurrent abortions
- Intra uterine fetal death
- intra-uterine growth retardation
- premature delivery
- fetal malposition
- higher rate of Caesarean section
- retained placenta
- gynecological complications such as obstructive hematocolpos & hematometra

- 
- ❖ SALIM/AFS- 2003
 - ❖ ESHRE/ESGE- 2013-16
 - ❖ CUME-2018
 - ❖ ASRM-2016
 - ❖ ASRM-2021

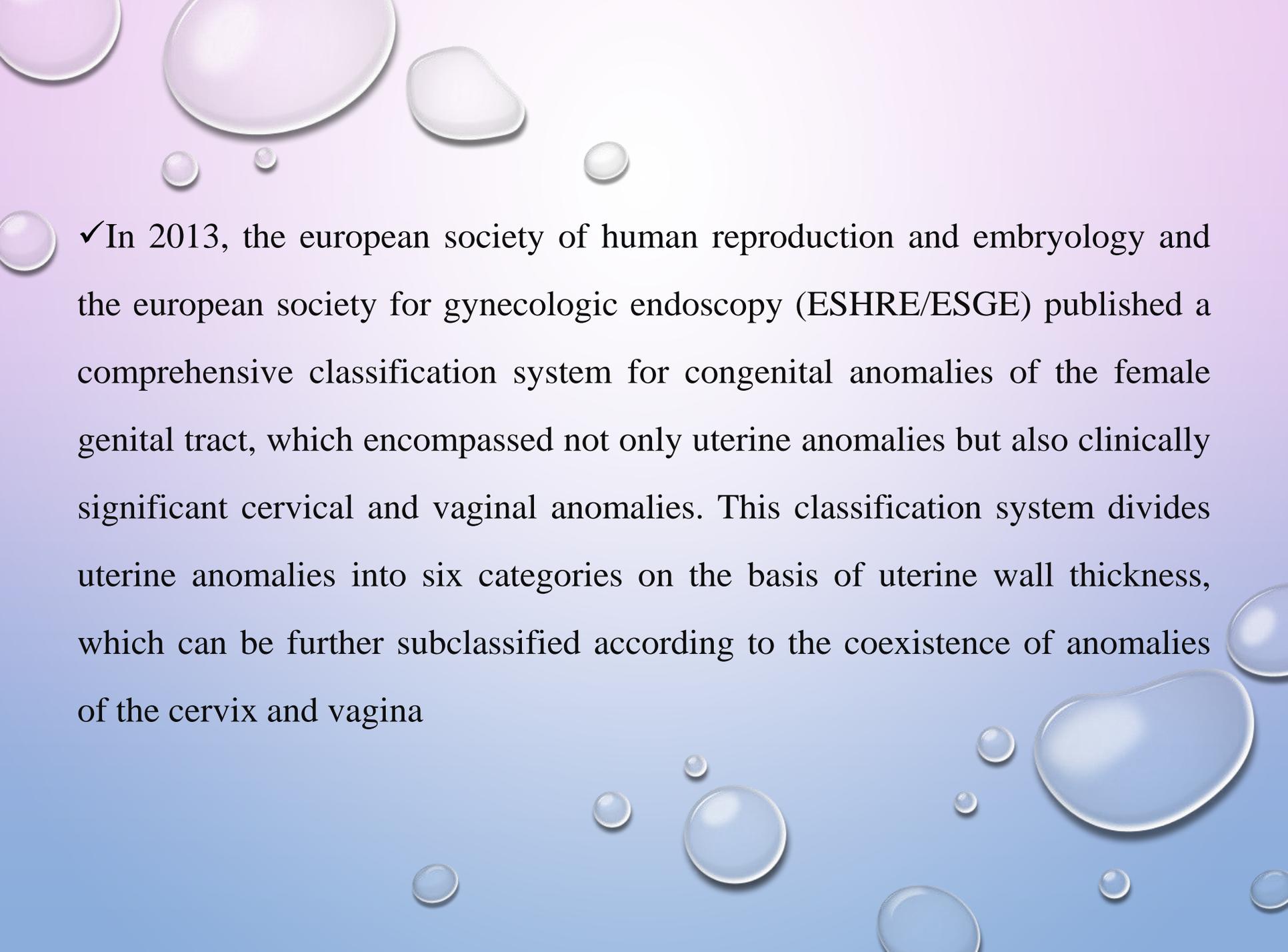


✓The earliest classification system was proposed by eduard kaufmann, a german pathologist, and published in the american literature by an obstetrician named julius jarcho in 1946. The american fertility society published their initial classification system, which included seven classes of anomalies, in 1988, including an arcuate uterus



The AFS Classification of Anomalies

1. Class I (agenesis/hypoplasia)
2. Class II (unicornuate uterus)
3. Class III (didelphys uterus)
4. Class IV (bicornuate uterus)
5. Class V (septate uterus)
6. Class VI (arcuate uterus)
7. Class VII (diethylstilbestrol-related anomalies; DES)



✓ In 2013, the European Society of Human Reproduction and Embryology and the European Society for Gynecologic Endoscopy (ESHRE/ESGE) published a comprehensive classification system for congenital anomalies of the female genital tract, which encompassed not only uterine anomalies but also clinically significant cervical and vaginal anomalies. This classification system divides uterine anomalies into six categories on the basis of uterine wall thickness, which can be further subclassified according to the coexistence of anomalies of the cervix and vagina.

THE ESHRE/ESGE CLASSIFICATION FOR UTERINE MORPHOLOGY

1. Class U0 (normal uterus)

2. Class u1 (dysmorphic uterus)
 - Sub-class u1a (t-shape)
 - Sub-class u1b (infantilis)
 - Sub-class u1c (others)

3. Class u2 (septate uterus)
 - Sub-class u2a (partial)
 - Sub-class u2b (complete)

4. Class U3 (bicorporeal uterus)
 - Sub-class u3a (partial)
 - Sub-class u3b (complete)
 - Sub-class u3c (bicorporeal septate)

5. Class u4 (hemi-uterus)
 - Sub-class u4a (with rudimentary cavity)
 - Sub-class u4b (without rudimentary cavity)

6. Class u5 (aplastic uterus)
 - Sub-class u5a (with rudimentary cavity)
 - Sub-class u5b (without rudimentary cavity)

7. Class u6 (unclassified cases)

<p>Class U0 / Normal Uterus</p> 	<p>Class U1 / Dysmorphic Uterus</p>  <p>a. T-shaped b. infantile c. others</p>
<p>Class U2 / Septate Uterus</p>  <p>a. partial b. complete</p>	<p>Class U3 / Bicornuate Uterus</p>  <p>a. partial b. complete c. bicornuate/septate</p>
<p>Class U4 / Hemi Uterus</p>  <p>a. with rudimentary cavity b. without rudimentary cavity</p>	<p>Class U5 / Aplastic Uterus</p>  <p>a. with rudimentary cavity b. without rudimentary cavity</p>
<p>Class U6 / Unclassified Cases</p>	

Class U1
Dysmorphic Uterus



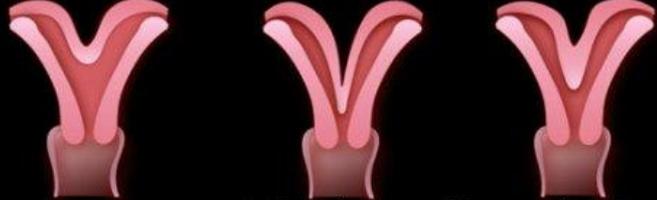
a. T-shaped b. Infantile c. Others

Class U2
Septate Uterus



a. Partial b. Complete

Class U3
Bicornuate Uterus



a. Partial b. Complete c. Bicornuate/septate

Class U4
Hemi Uterus

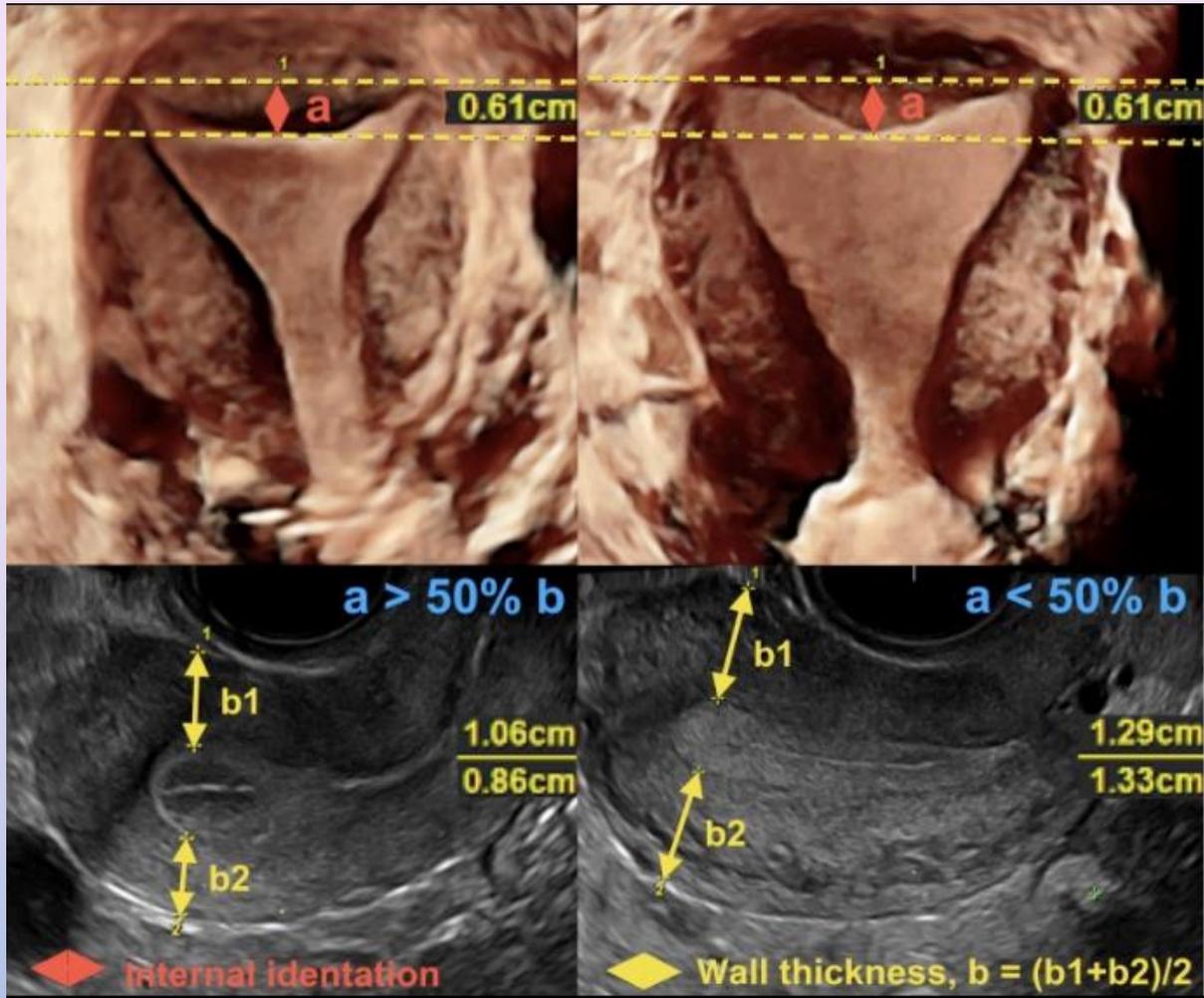


a. with rudimentary cavity b. No rudimentary cavity

Class U5
Aplastic Uterus



a. with rudimentary cavity b. No rudimentary cavity

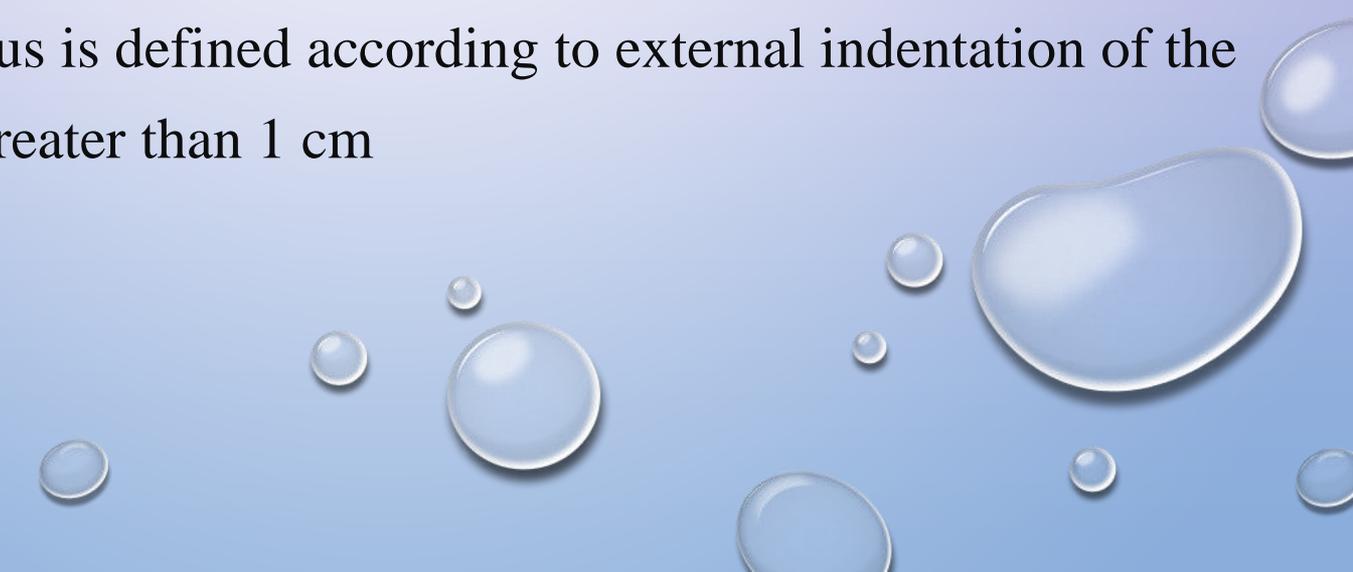


Normal uterus by ASRM with the same length of internal fundal indentation in coronal view (top row); may be recognized paradoxically by ESHRE-ESGE as a septate (case on left) or normal uterus (case on right) depending on the thickness of the uterine wall in the sagittal view (bottom row).



✓ According to the ASRM 2016 guidelines, a normal or arcuate uterus is defined according to the depth of internal indentation of less than 1 cm and an angle of internal indentation of greater than 90° . A septate uterus is defined according to internal indentation of greater than 1.5 cm and less than 90°

✓ A bicornuate uterus is defined according to external indentation of the fundal contour of greater than 1 cm

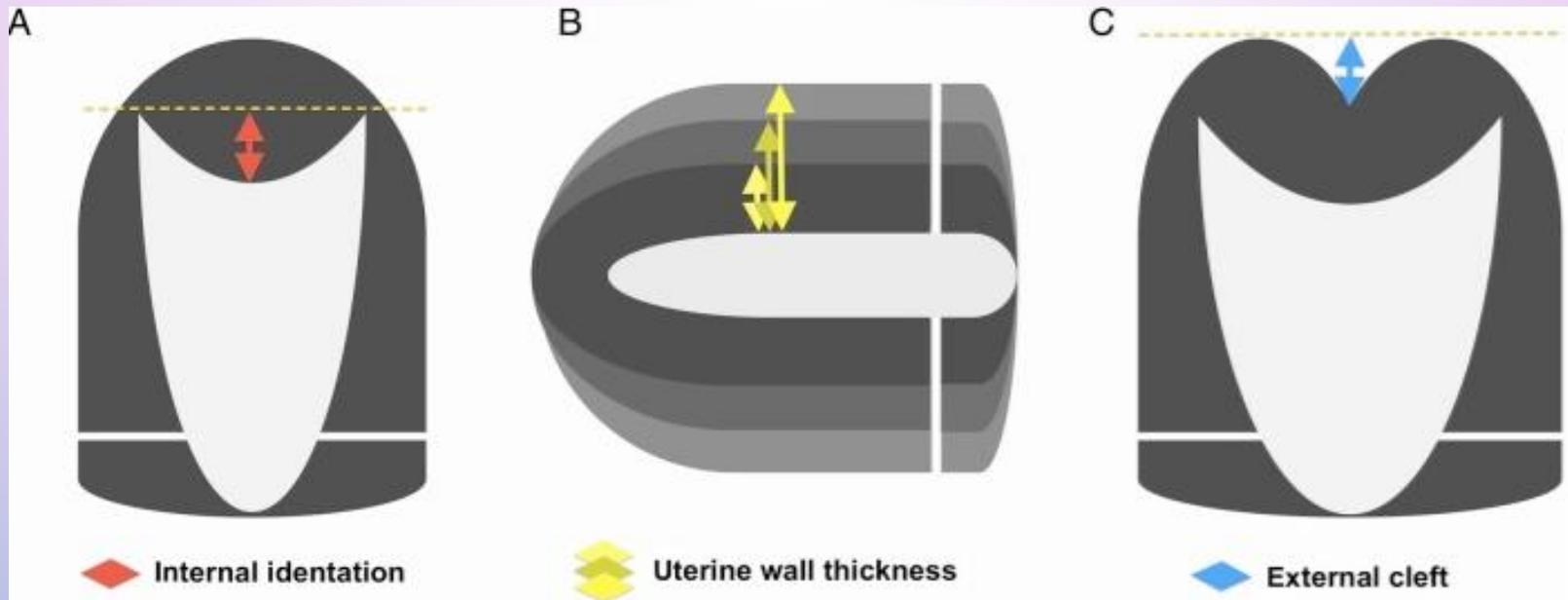


✓ The suggested ESHRE-ESGE cut-off value overestimates the prevalence of septate uterus while that of ASRM underestimates this prevalence, leaving in the gray-zone most of the uteri that experts considered as septate. We recommend considering indentation depth ≥ 10 mm as septate, since the measurement is simple and reliable and this criterion is in agreement with expert opinion. Copyright © 2017 ISUOG. Published by John Wiley & Sons Ltd.

Guideline	Definition for septate uterus
ESHRE-ESGE (2013) ¹⁴	I:WT > 50 %
ASRM (2016) ⁶	Angle < 90° and depth > 15 mm [*]
AFS (1988) ⁵ and initial CUME definition	Clinically relevant by subjective impression
Suggested by CUME	Depth ≥ 10 mm [†]
	Angle < 140°
	I:WT > 110%

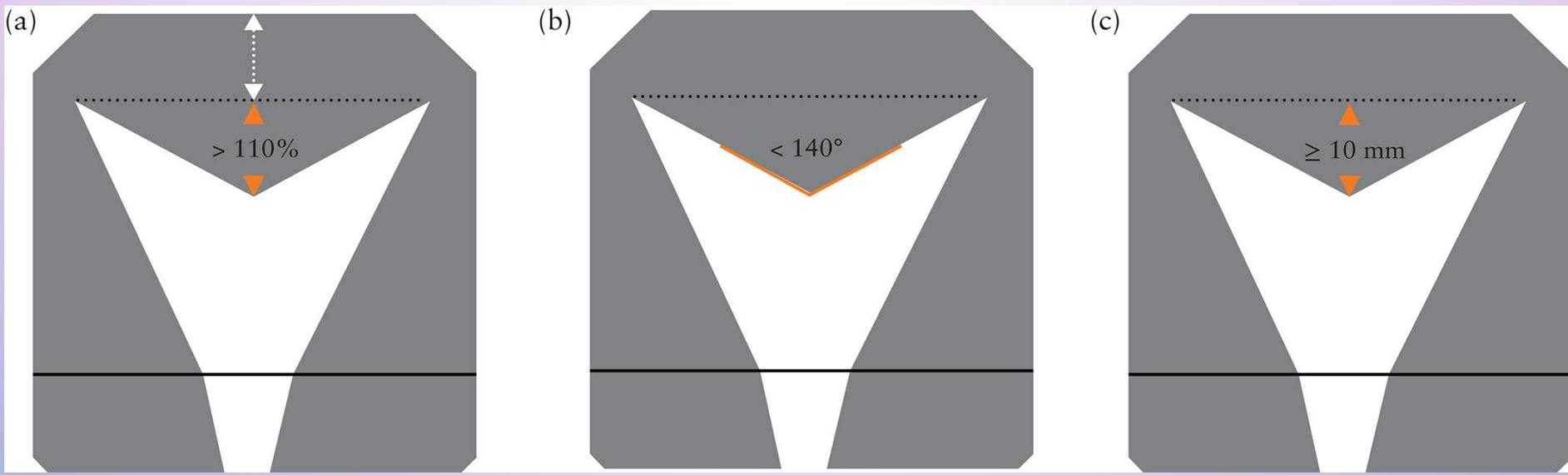
I:WT > 110%

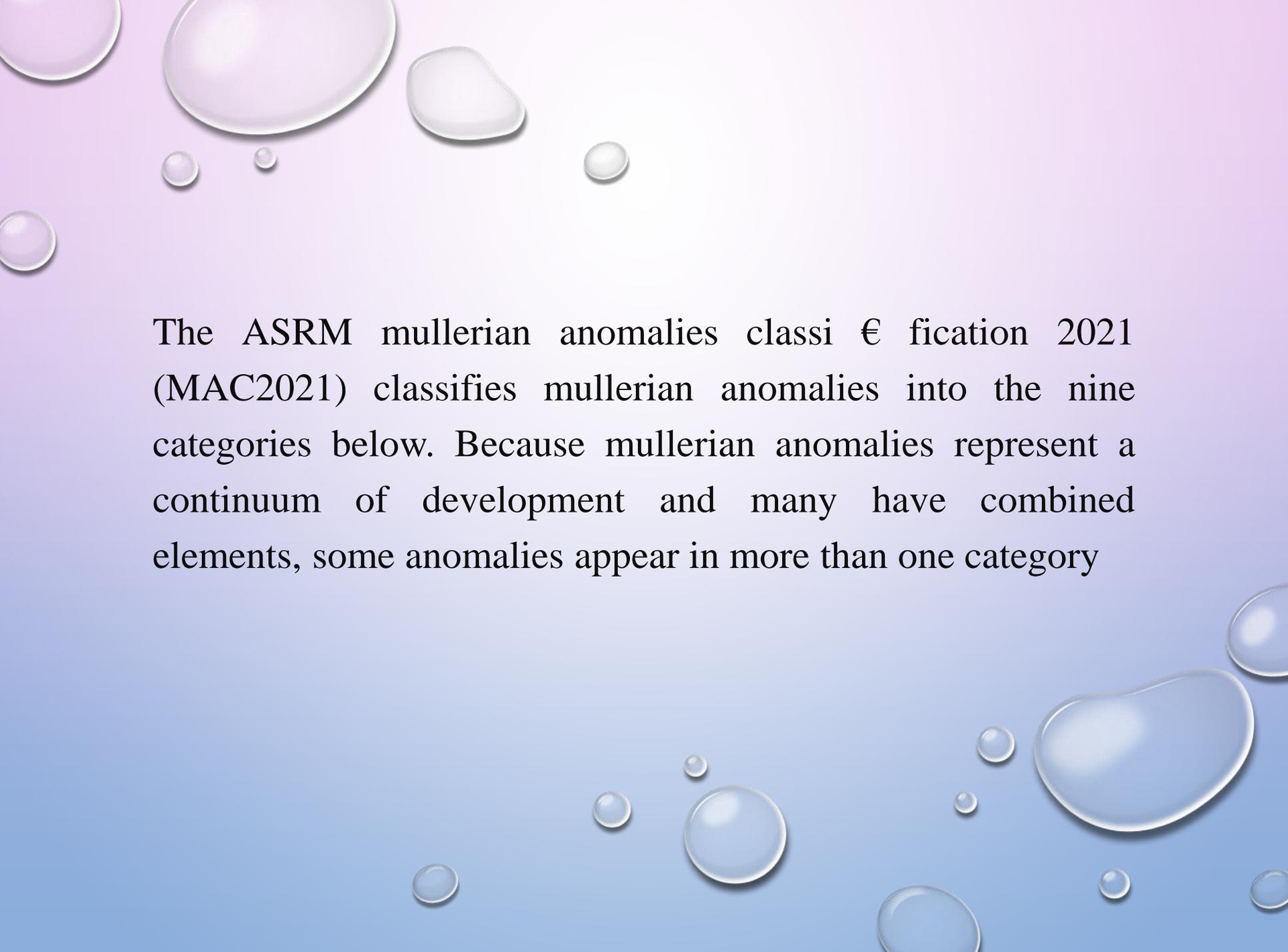
Angle < 140°



Differentiation of normal, septate and bicorporeal uterus by the ESHRE–ESGE classification system. (A–C) The use of uterine wall thickness to define uterine deformity is a serious shortcoming in the ESHRE–ESGE classification because, as an independent and variable parameter (B), it does not reflect the degree of deformation of the uterine cavity (A) and the degree of deformation of the outer structure (C).

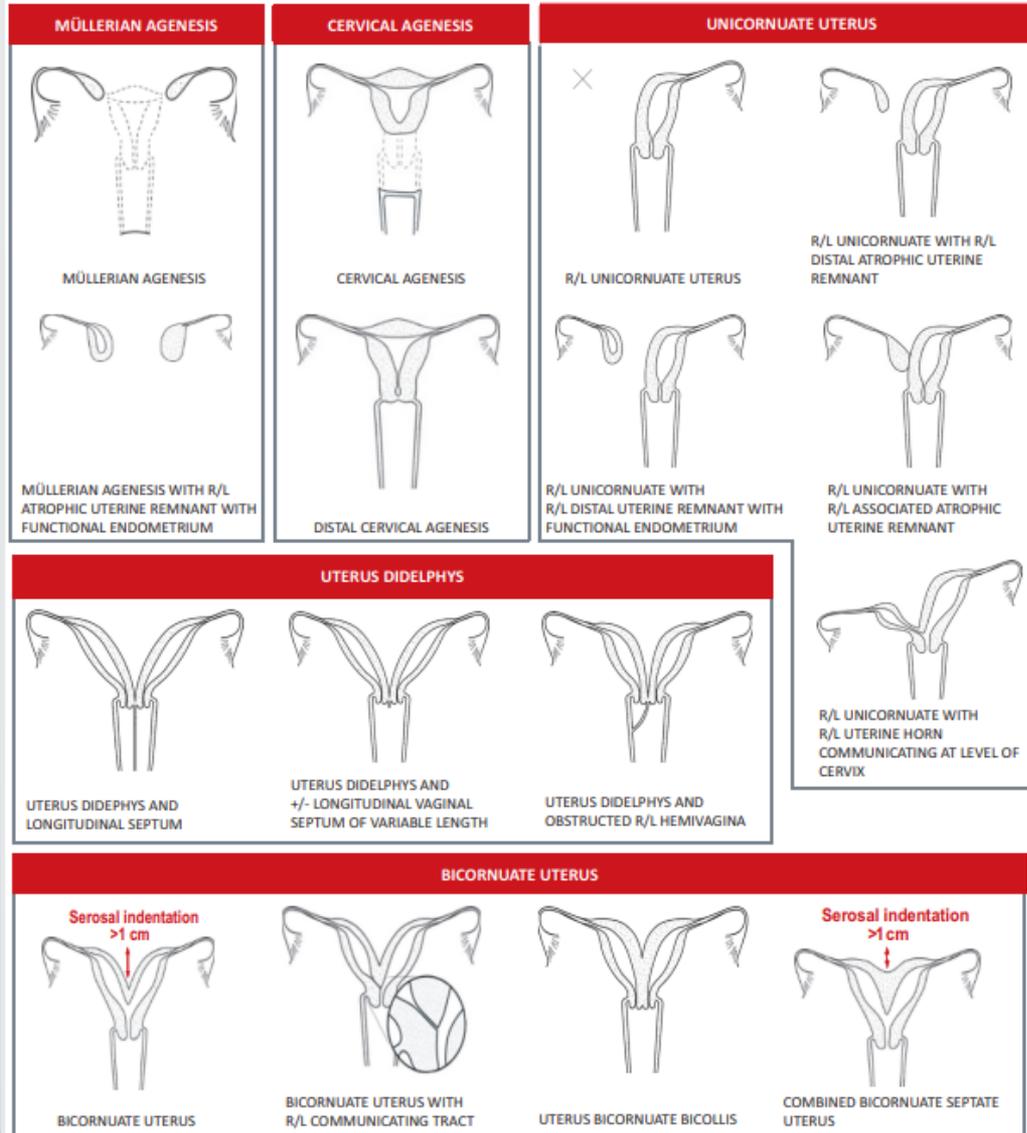
Congenital uterine anomalies : Communicating Uterus

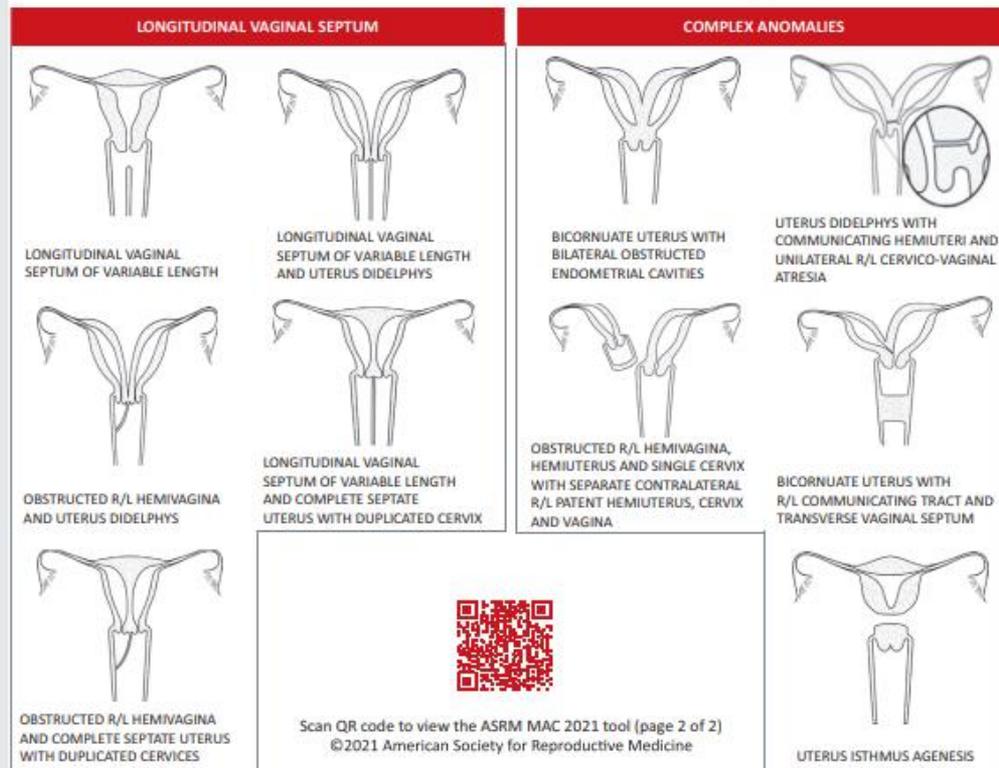
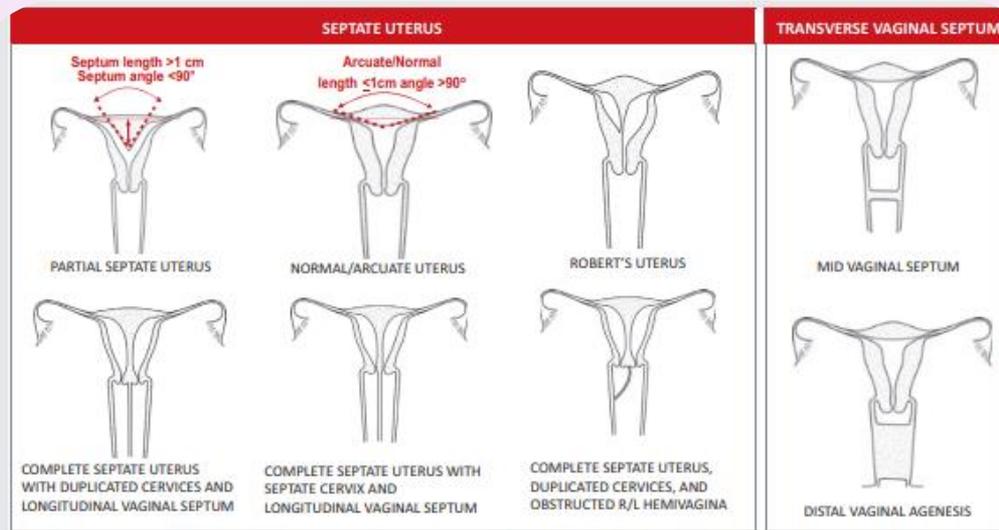




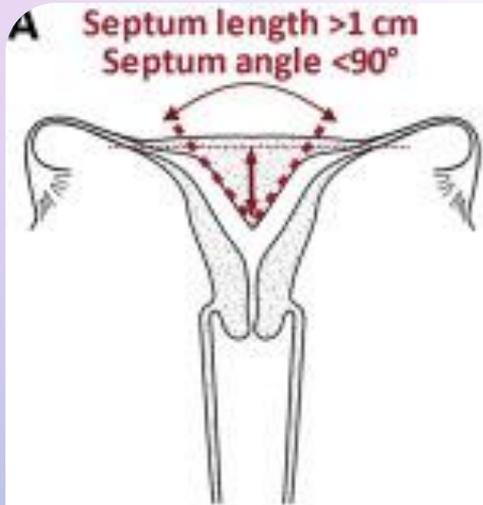
The ASRM mullerian anomalies classification 2021 (MAC2021) classifies mullerian anomalies into the nine categories below. Because mullerian anomalies represent a continuum of development and many have combined elements, some anomalies appear in more than one category

- 
1. Mullerian agenesis
 2. Cervical agenesis
 3. Unicornuate uterus
 4. Uterus didelphys
 5. Bicornuate uterus
 6. Septate uterus
 7. Longitudinal vaginal septum
 8. Transverse vaginal septum
 9. Complex anomalies



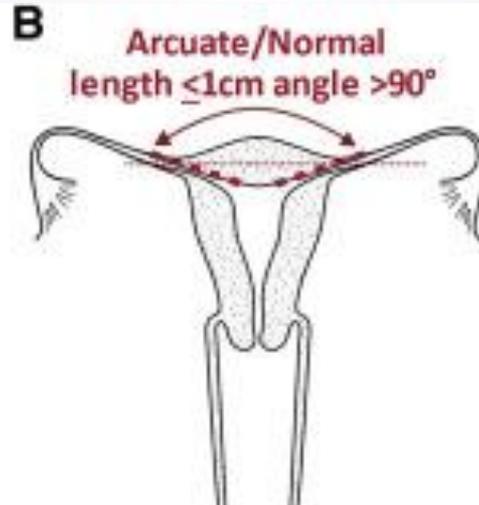


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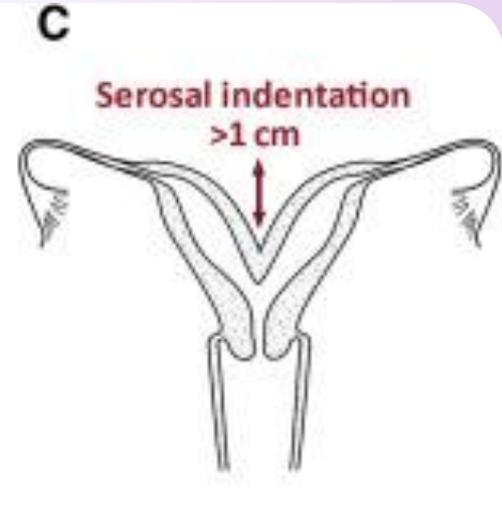
PARTIAL SEPTATE UTERUS

PARTIAL SEPTATE UTERUS



NORMAL/ARCUATE UTERUS

NORMAL/ARCUATE UTERUS



BICORNUATE UTERUS

BICORNUATE UTERUS

Obstructed Hemivagina and Ipsilateral Renal Anomaly

Obstructed Hemivagina and Ipsilateral Renal Anomaly (OHVIRA) (ie, Herlyn-Werner-Wunderloch syndrome) is an uncommon Mullerian duct anomaly that is associated with a uterine anomaly and renal dysplasia or renal agenesis.

Any congenital uterine anomaly should prompt evaluation of the urinary tract to assess for renal anomalies, and specifically in women with an OHVIRA, for ectopic ureteral insertion into the obstructed hemivagina. Patients typically present after menarche with cyclical abdominal pain or dysmenorrhea, because menses causes recurrent bleeding into the obstructed hemivagina.

Uncommonly, patients with this condition present later in life because of the presence of a small septal defect that allows incomplete obstruction of the hemivagina. Three different categories of this syndrome, with variable clinical and imaging manifestations, have been described.

Type I is an obstructed hemivagina without communication to the ipsilateral uterine cavity. Type II is a partially obstructed hemivagina with a small opening. Type III is a hemivaginal septum with a cervical fistula.

Endometriosis occurs in approximately 17% of these patients, possibly because of recurrent retrograde menstrual flow.

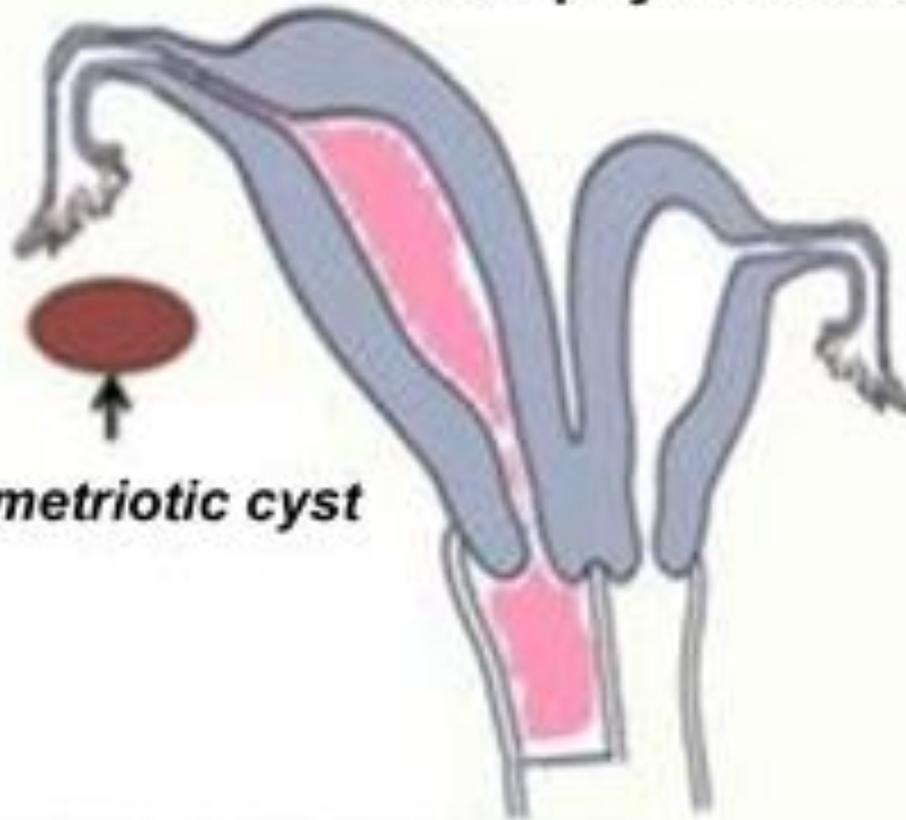
C



Renal Agenesis



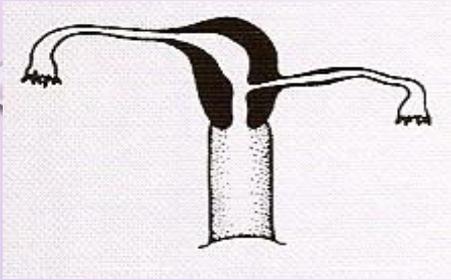
Didelphys Uterus



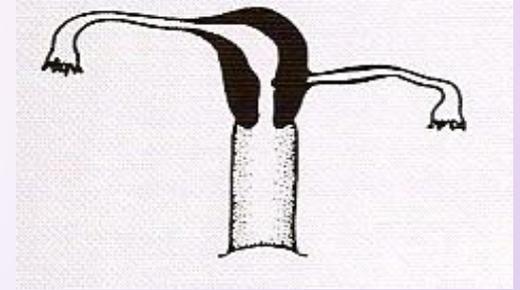
endometriotic cyst

Obstructed Hemivagina

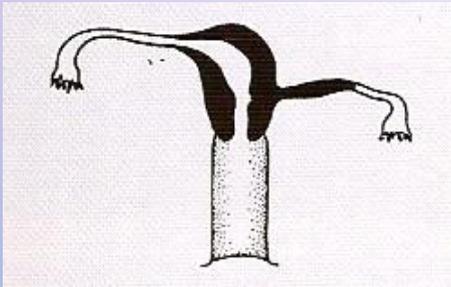
Different types of Unicornuate uterus



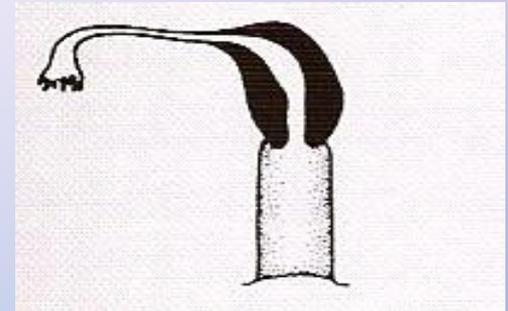
Atretic horn with communicating cavity



Atretic horn with non - communicating cavity

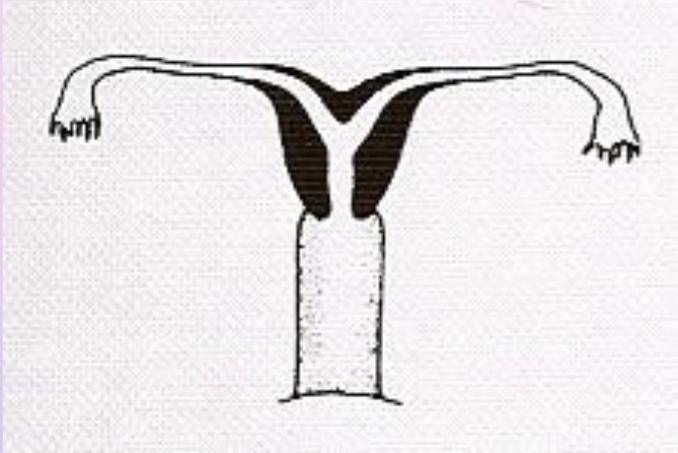


Atretic horn without cavity



No Atretic horn

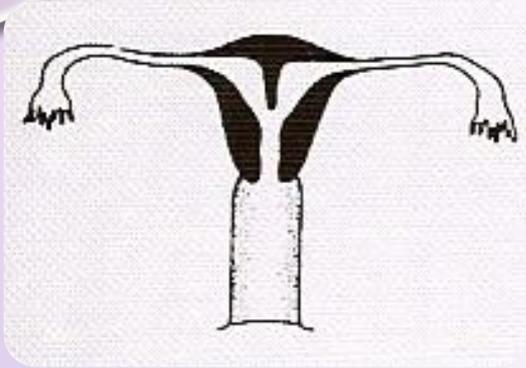
Bicornuate uterus - Didelphus





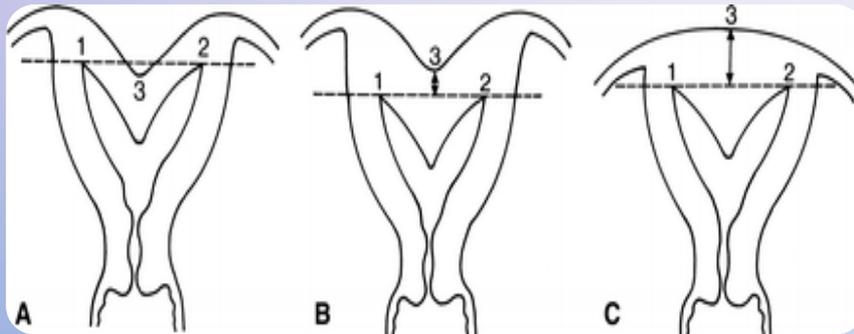


Septate uterus



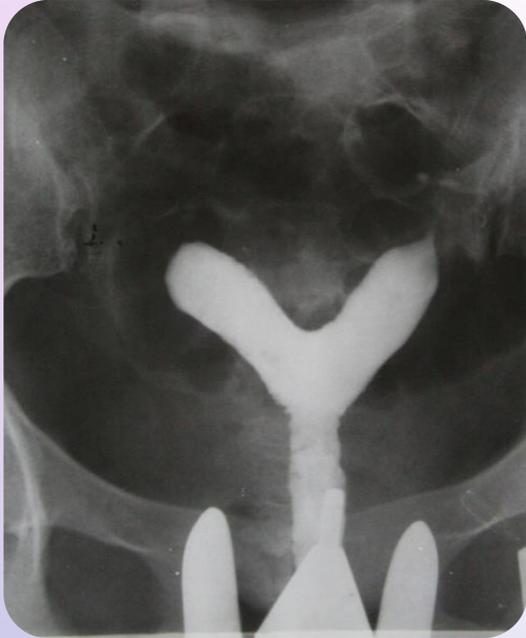
Fusion complete but medial
Wall persists (partial or
Complete) ; smooth or
Minimally indented
Fundal contour

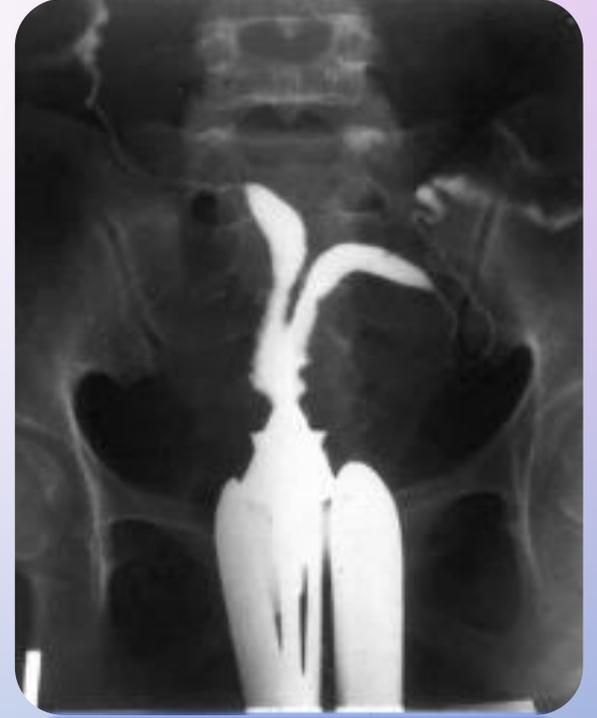
highest risk of recurrent
spontaneous abortions



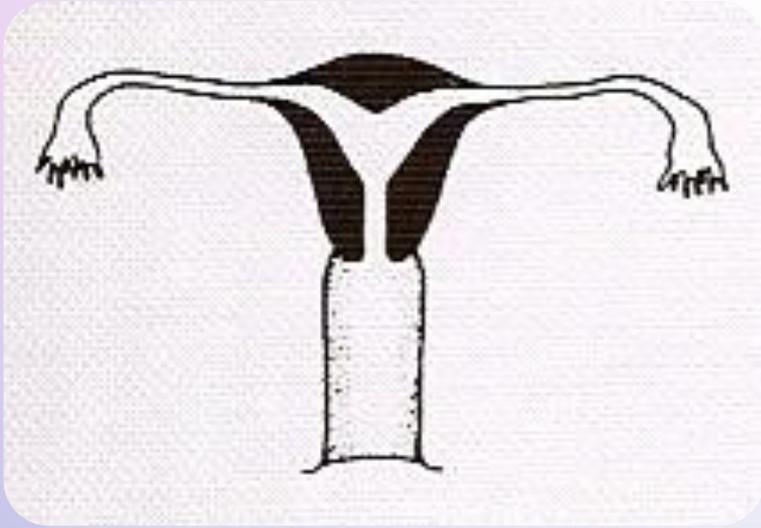
Classification criteria for US differentiation of septate from bicornuate uteri. A, When apex (3) of the fundal external contour occurs below a straight line between the tubal ostia (1, 2) or, B, 5 mm (arrow) above it, the uterus is bicornuate. C, When apex is more than 5 mm (arrow) above the line, uterus is septate.

Congenital uterine anomalies : Septated Uterus





Arcuate uterus



Mildest ' anomaly ' ; smooth
Questionable impact on
Or convex outer fundal
reproductive function
Contour ; broad-based
Myometrial bulge on fundal
endometrium



Arcuate uterus. HSG image
demonstrates broad fundal
indentation (arrow).

Congenital uterine anomalies : Arcuate Uterus

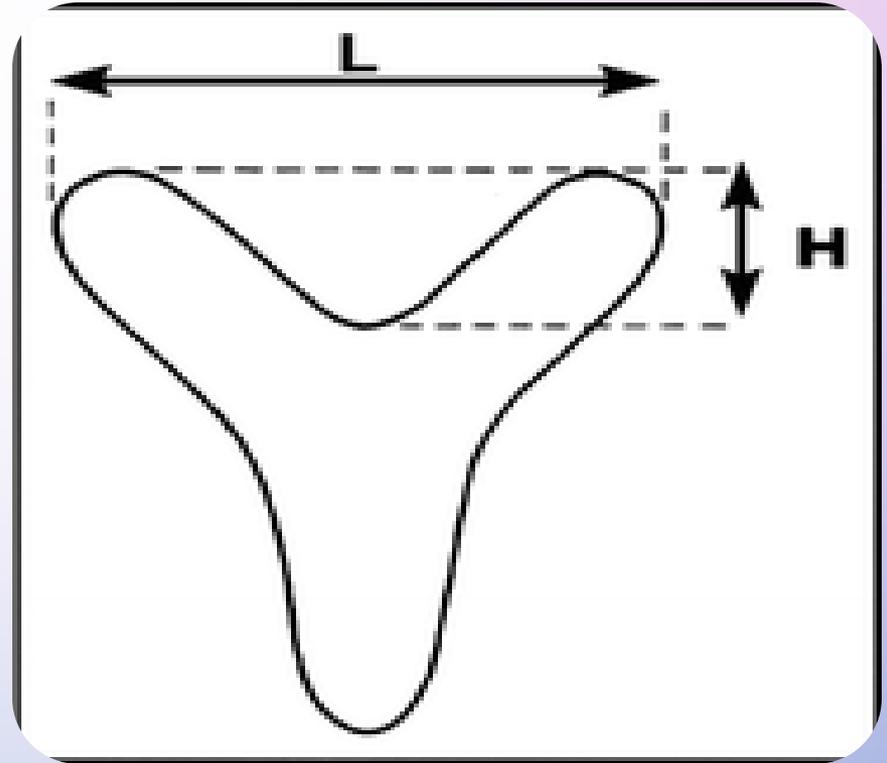
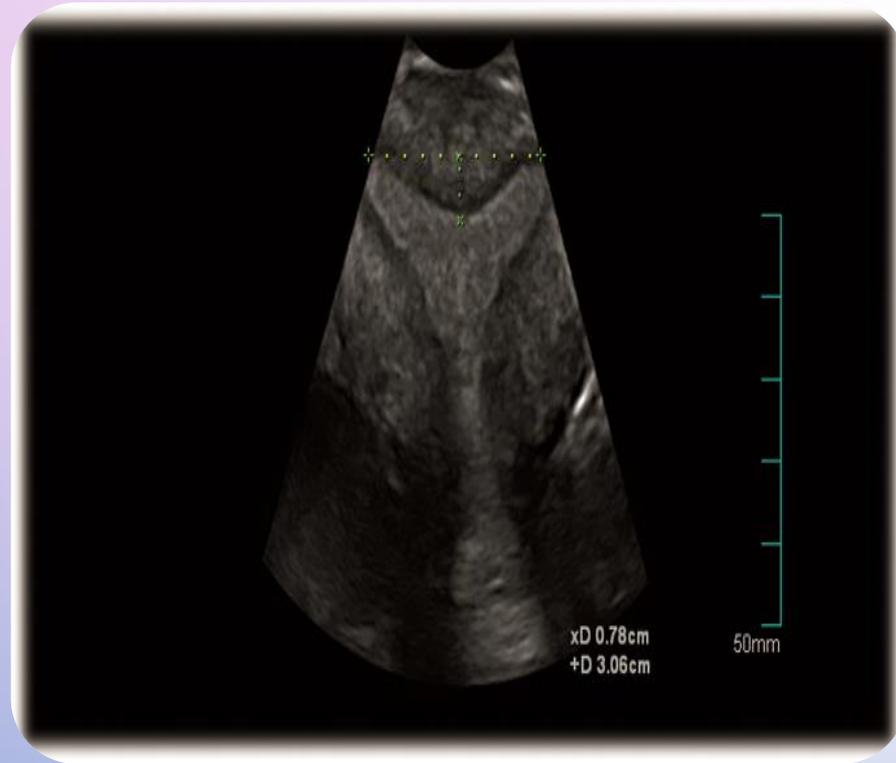
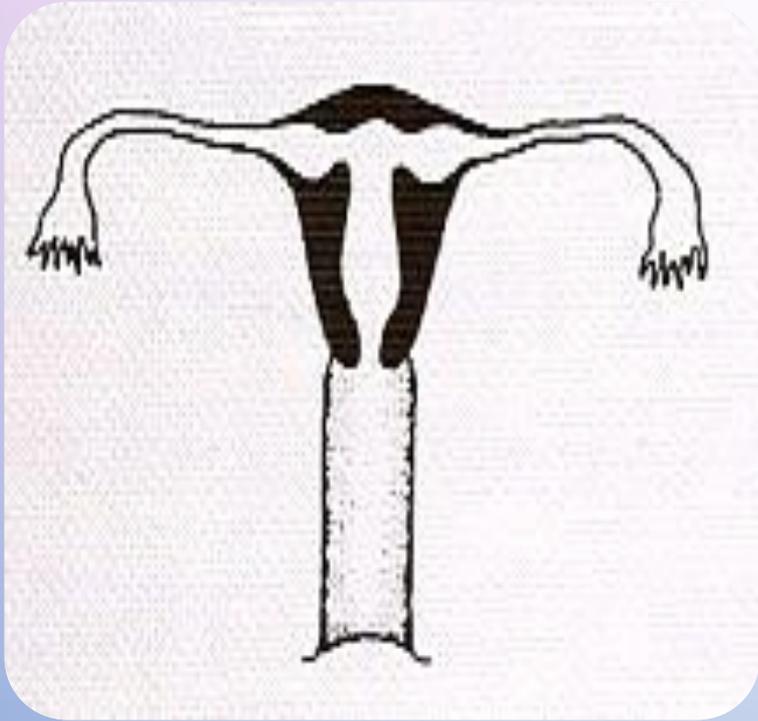
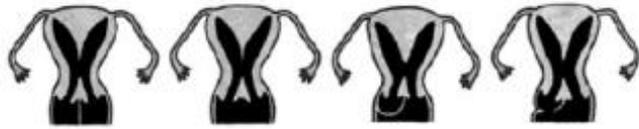


Diagram of arcuate uterus ratio. When ratio of height (H) to length (L) is less than 10%, an adverse reproductive outcome is not expected. (Reprinted, with permission, from reference Pellerito et al. Radiology. 1992; 183:795-800.)

DES uterus





Type 1a

Type 1b

Type 2a

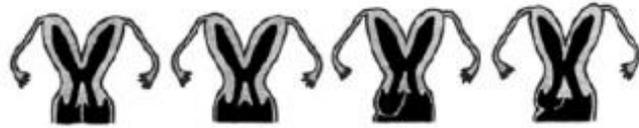
Type 2b



Type 3a

Type 3b

Type 3c

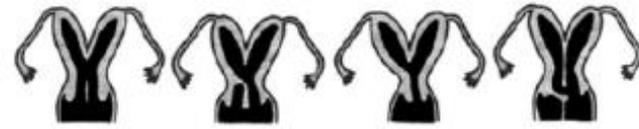


Type 4a

Type 4b

Type 5a

Type 5b

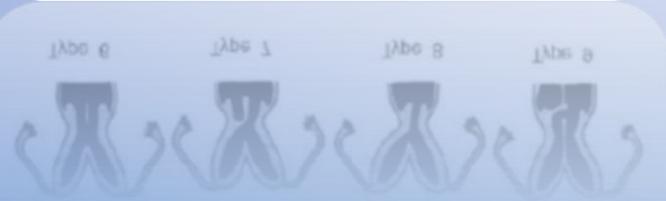


Type 6

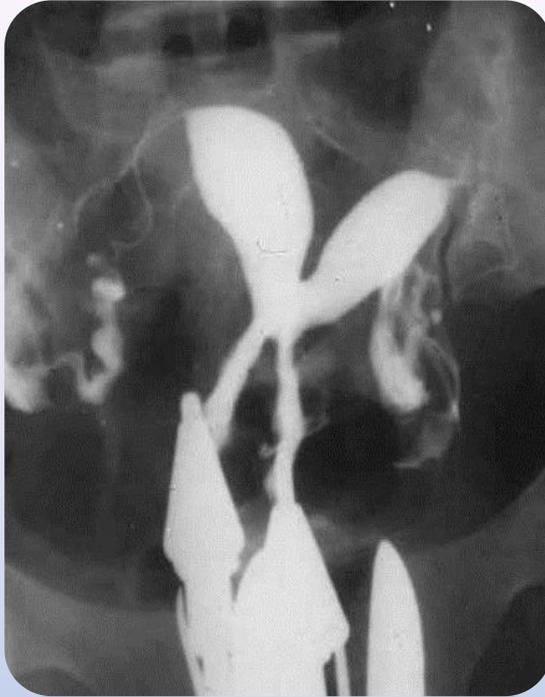
Type 7

Type 8

Type 9



Congenital uterine anomalies : Communicating Uterus





Dysmorphic Uterus

- ▶ A dysmorphic uterus, formerly known as **T-shaped uterus**” in the *American Fertility Society* classification of anomalies of the müllerian duct.
- ▶ It denoted as a **second-class (Class U1)** uterine anomaly in the *European Society of Human Reproduction and Embryology (ESHRE)* and the *European Society for Gynaecological Endoscopy (ESGE)* (*ESHRE/ESGE*) consensus on the classification of congenital genital tract anomalies.
- ▶ **It leads to poor reproductive and obstetric outcomes.**

T-shaped uterus

- ▶ **Prevalence** of dysmorphic uterus is not yet known.
- ▶ In the past, operative **hysteroscopy** for metroplasty was used to expand the uterine cavity;
- ▶ Currently, **office hysteroscopy** with a bipolar system is used, which appears to have minimally invasive effects, thus making it feasible for metroplasty.

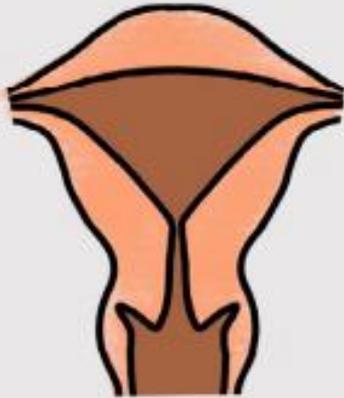
Classification

- ▶ **Class U1 or dysmorphic uterus** incorporates all cases with normal uterine outline but with an abnormal shape of the uterine cavity excluding septa. Class I is further subdivided into three categories:
 - ▶ - **Class u1a** or t-shaped uterus characterized by a narrow uterine cavity due to thickened lateral walls with a correlation $\frac{2}{3}$ uterine corpus and $\frac{1}{3}$ cervix.
 - ▶ - **Class u1b** or **uterus infantilis** characterized also by a narrow uterine cavity without lateral wall thickening and an inverse correlation of $\frac{1}{3}$ uterine body and $\frac{2}{3}$ cervix.

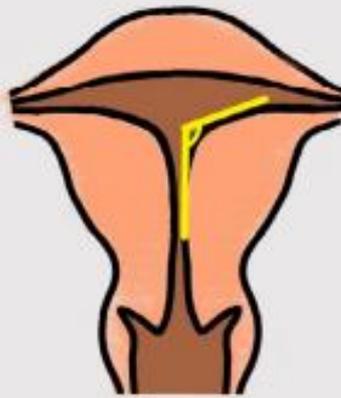
Classification

- ▶ - **Class ulc** or others which is added to include all minor deformities of the uterine cavity including those with an inner indentation at the fundal midline level of ,50% of the uterine wall thickness.
- ▶ This aims to facilitate groups who want to study patients with minor deformities and to clearly differentiate them from patients with septate uterus .Usually, dysmorphic uteri are smaller in size.

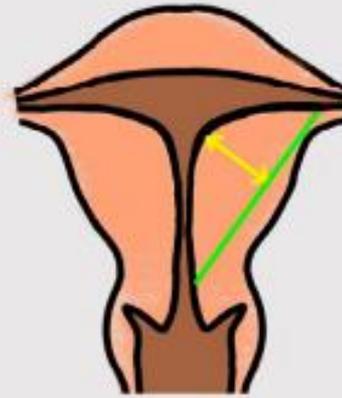
Normal



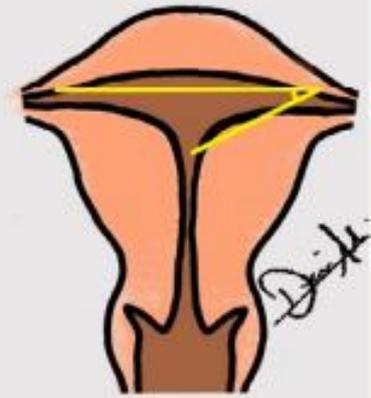
T-shaped by CUME



(a)



(b)



(c)

(a) Lateral indentation angle: $\leq 130^\circ$

(b) Lateral indentation depth: $\geq 7 \text{ mm}$

(c) T-angle: $\leq 40^\circ$

The lateral indentation depth was measured as the distance between the line that connects the most lateral point of the uterine cavity to the internal orifice and the apex of the lateral indentation. The lateral indentation angle was calculated based on three points: the apex of lateral indentation; and two points on the myometrium–endometrium interface 5 mm distant from the first one. The T-angle was calculated using three points: the most lateral point of the uterine cavity; the most contralateral point of the uterine cavity; and the apex of ipsilateral lateral indentation (Ludwin et al., 2020). Cut-off levels for the lateral indentation depth, lateral indentation angle and T-angle were accepted as 7 mm or over, 130° or less, and 40° or more, respectively. If two out of three criteria were met, the uterus was classified as borderline T-shaped, whereas, if all criteria were met, it was classified as T-shaped. CUME, Congenital Uterine Malformation by Experts.

Class U1/dysmorphic uterus

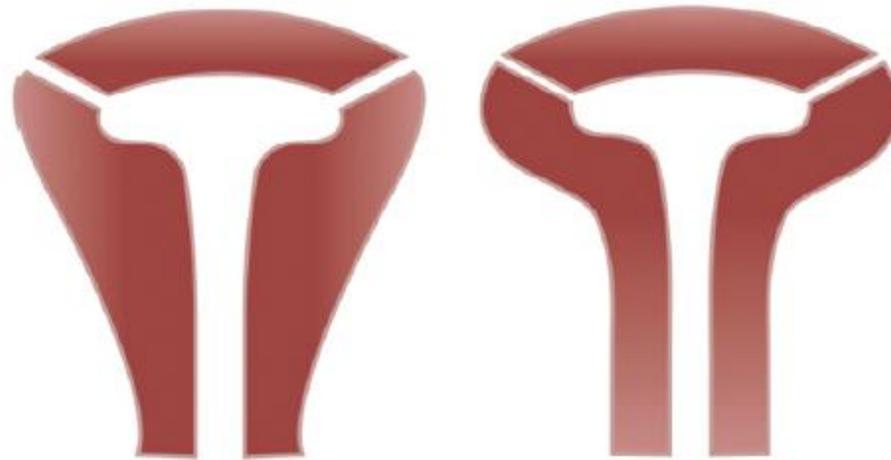


Figure 1 Dysmorphic uteri according to European Society of Human Reproduction and Embryology and the European Society for Gynaecological Endoscopy classification of female genital tract congenital anomalies (Grimbizis et al., 2013). (a) T-shaped uterus; (b) uterus infantalis.

(b) uterus infantalis.

congenital anomalies (Grimbizis et al., 2013). (a) T-shaped uterus.



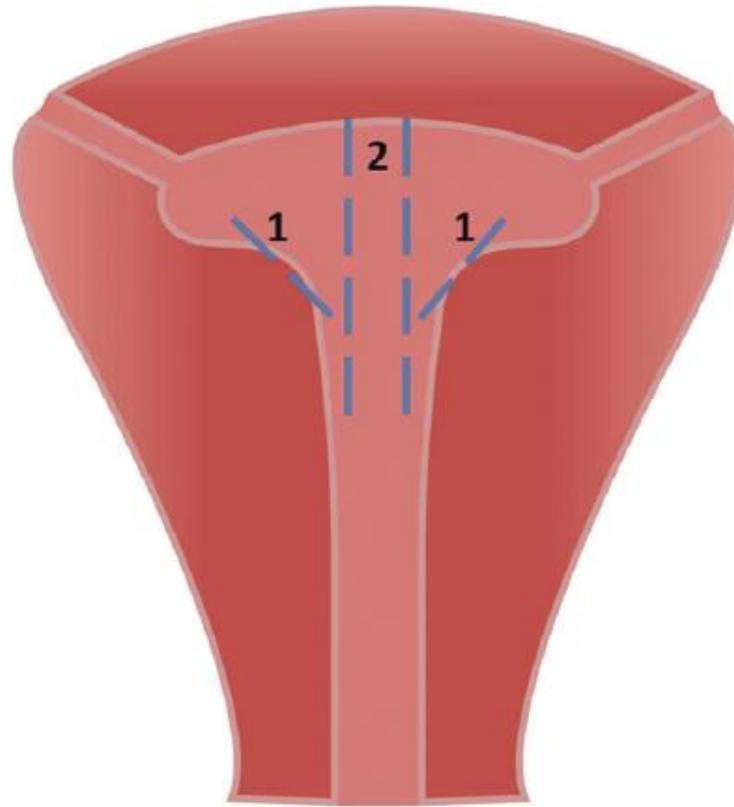


Figure 4 The HOME-DU technique on a frontal view of a T-shaped uterus. (1) incisions on the fibro-muscular constriction rings in the isthmus area of the uterine side walls; (2) incisions on the anterior walls. Note that incisions on posterior wall are symmetric peculiar to anterior incisions. Home-DU = Hysteroscopic Outpatient Metroplasty to Expand Dysmorphic Uteri.

Ουτεβατίζουτ μετλοβίαζελ το εχβαου δλαμοιρμικ ητεη' ηε βεσηαι το αυτεηιοι ινκίζιονεζ. Home-DU = Ηλζητελοζκοβικ

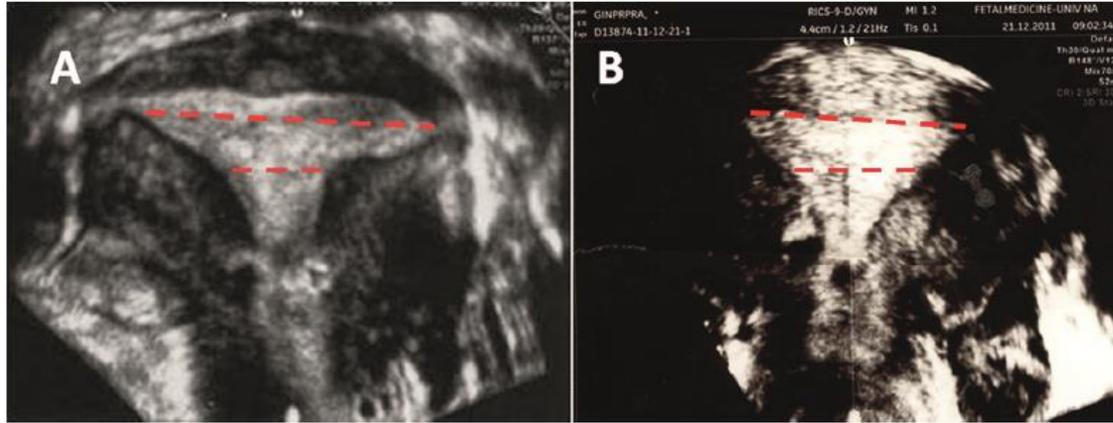


Figure 6 Three-dimensional transvaginal sonography showing an improvement of the volume and morphology of T-shaped uteri before (A) and after (B) the HOME-DU technique. An increase of the I/IO ratio was detected. I = isthmus diameter; IO = interstitial distance.

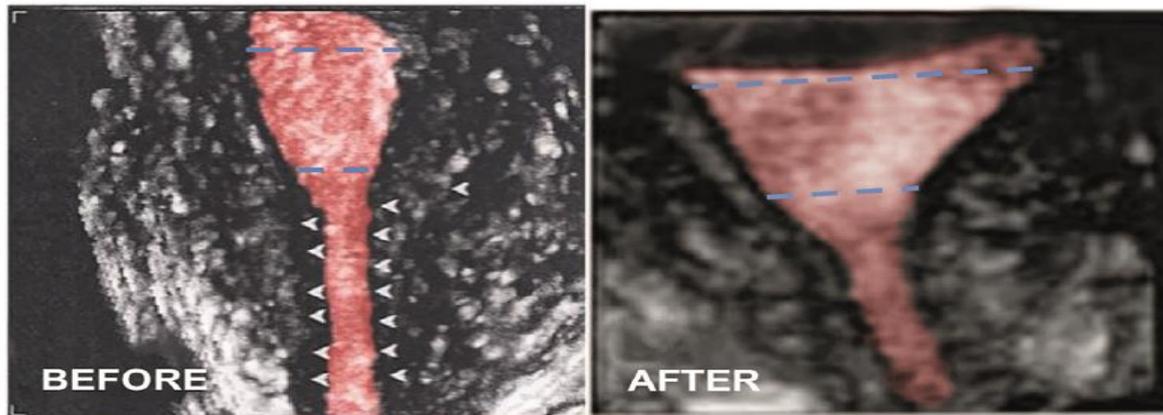
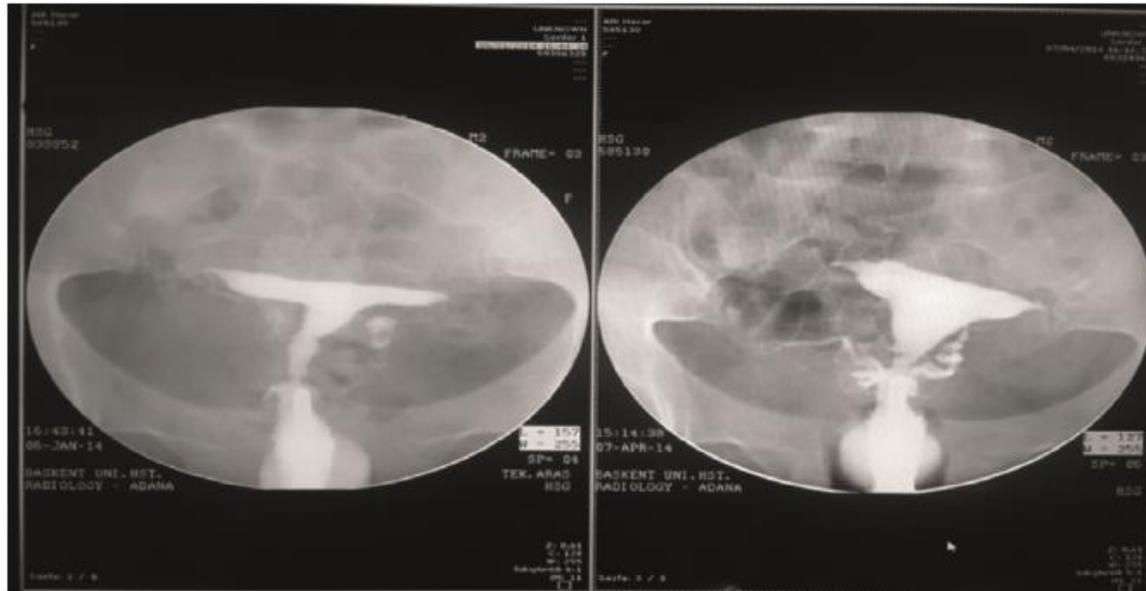


Figure 7 Three-dimensional transvaginal ultrasound showing the improvement of the volume and morphology of tubular-shaped uteri before and after the HOME-DU technique. A significant I/IO ratio decrease was noted. HOME-DU = Hysteroscopic Outpatient Metroplasty to Expand Dysmorphic Uteri; I = isthmus diameter; IO = interstitial distance.

μετριοβασίλ το εχθραυ ρλζωοιθμικ ηρεμ! I = ιζημικ ριαμερε! IO = ητεροζημια ριζηανσε*
 ηρεμ δεπορε αυη αιρεμ ημε HOWE-DU τεχνηημε. A ζιδημικανη I/IO ιαηιο ρεζηεαζε ηαη ηοτερ*HOWE-DU = ηλζηελοζηοζκοπικ οηηεβαηεμ
 Figure 7 Three-dimensional transvaginal ultrasonography showing the improvement of the volume and morphology of tubular-shaped



Picture 1. Preoperative and postoperative hysterosalpingography image

HSG: Hysterosalpingography

HSG: Hysterosalpingography
image

HSG: Hysterosalpingography image

اعبد الله
جله غم عاشقان
الاعراب