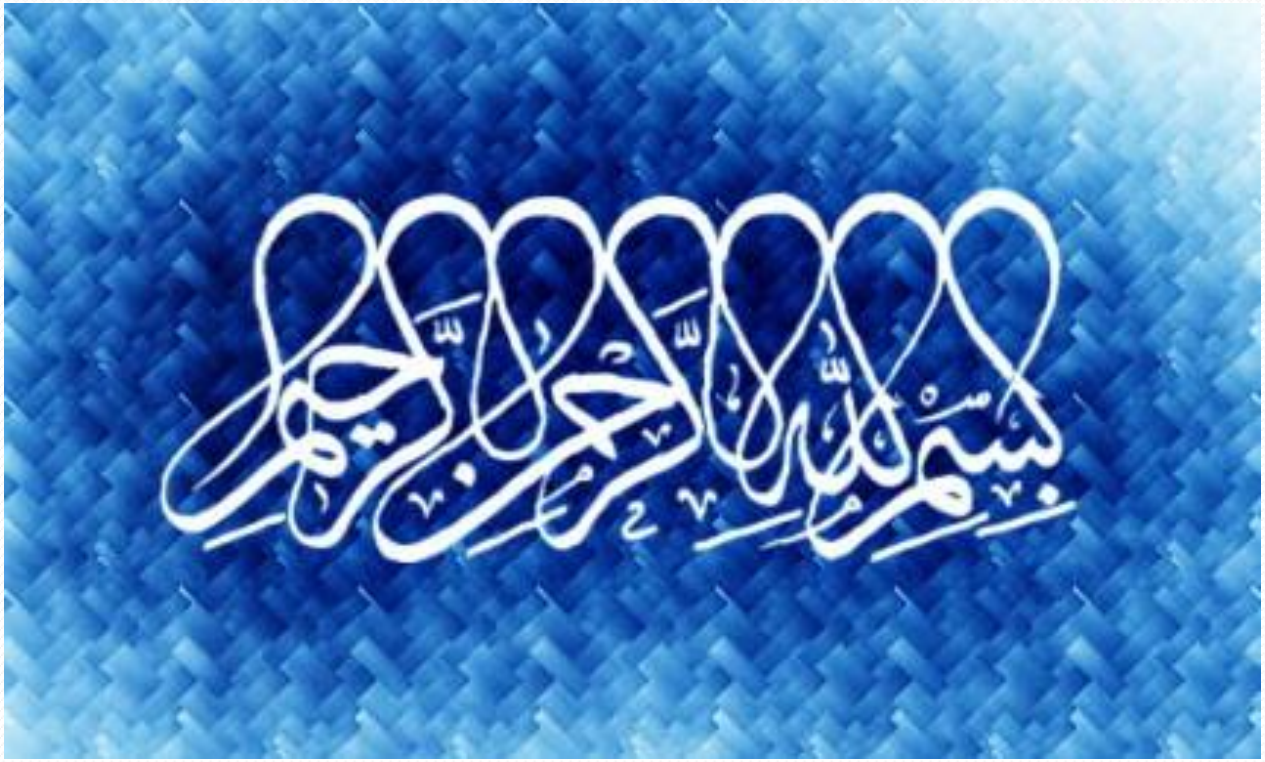

بسم الله الرحمن الرحيم

Mullerian Anomalies & infertility

Bahia Namavar Jahromi

12.11.98

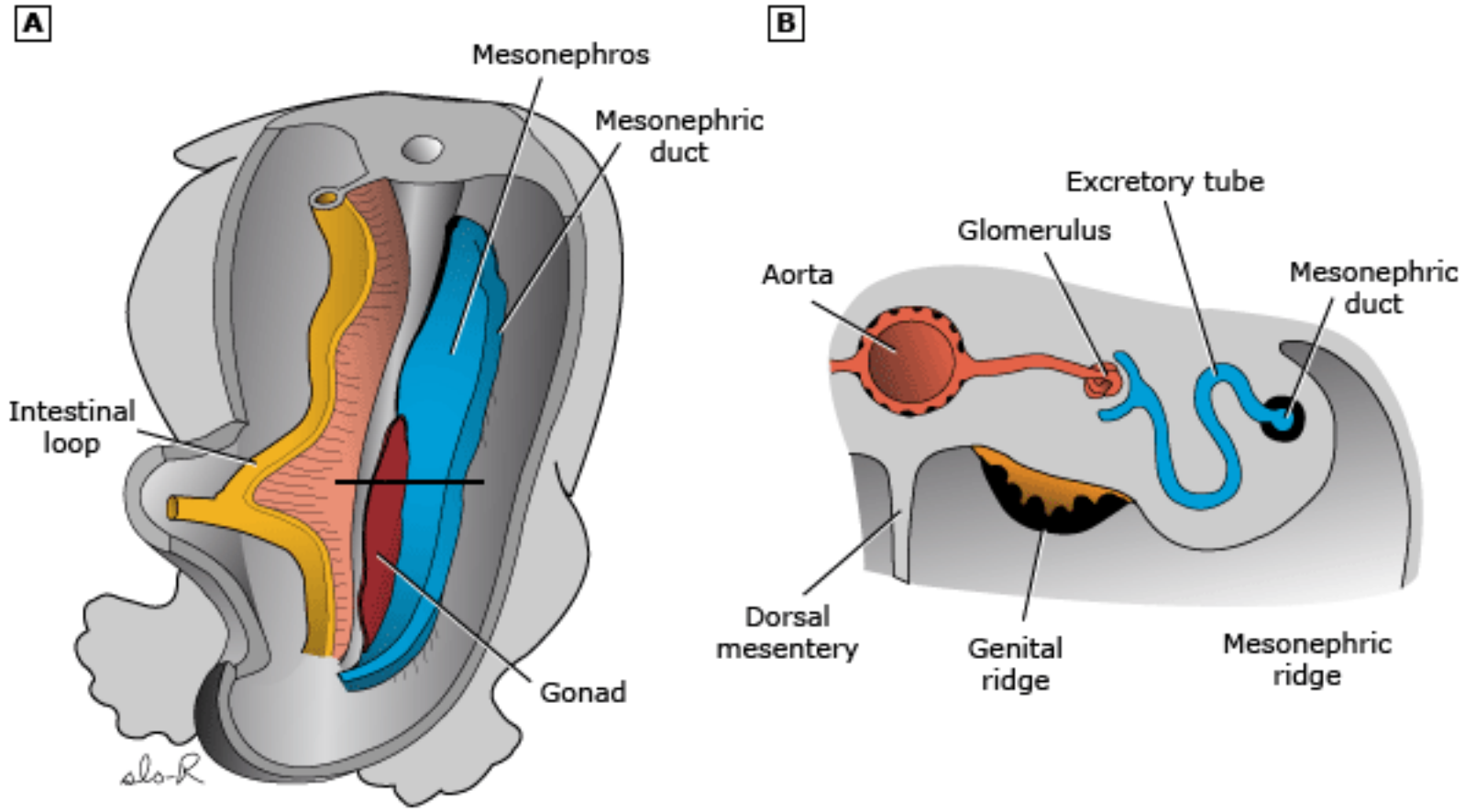
DENITOURINARY TRACT DEVELOPMENT

- In females, the external genitalia, gonads, and müllerian ducts each derive from different primordia and in close association with the urinary tract and hindgut.
- Abnormal embryogenesis during this process is thought to be multifactorial and can create sporadic anomalies.
- Several of these can lead to infertility, subfertility, miscarriage, or preterm delivery. Thus, knowledge of genitourinary system development is essential.

Embryology of the Urinary System

- Between the 3rd and 5th GA, an elevation of intermediate mesoderm on each side of the fetus—the urogenital ridge—begins development into the urogenital tract.
- The urogenital ridge divides into the genital ridge, destined to become the ovary, and into the nephrogenic ridge. The nephrogenic ridges develop into the mesonephros (mesonephric kidney) and paired mesonephric ducts, also termed wolffian ducts, which connect to the cloaca.

Genital tract embryologic development



(A) Relation of the genital ridge and the mesonephros showing location of the mesonephric duct.
(B) Transverse section through the mesonephros and genital ridge at the level indicated in (A).
From: Urogenital system. In: Langman's Medical Embryology, 14th ed, Sadler TW (Ed), Wolters Kluwer, Philadelphia 2019. Copyright © 2019. Reproduced with permission from Wolters Kluwer Health. Unauthorized reproduction of this material is prohibited.

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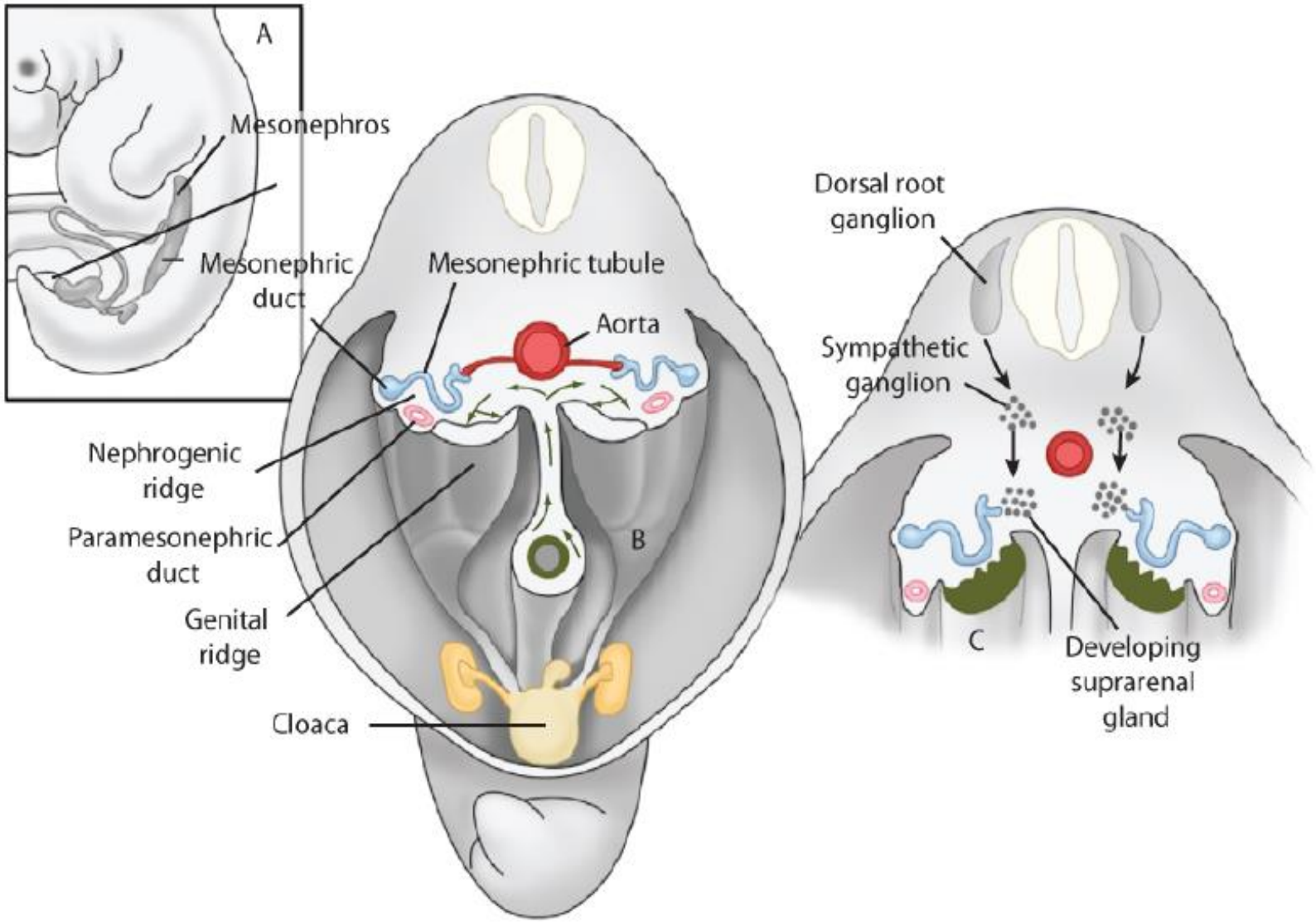
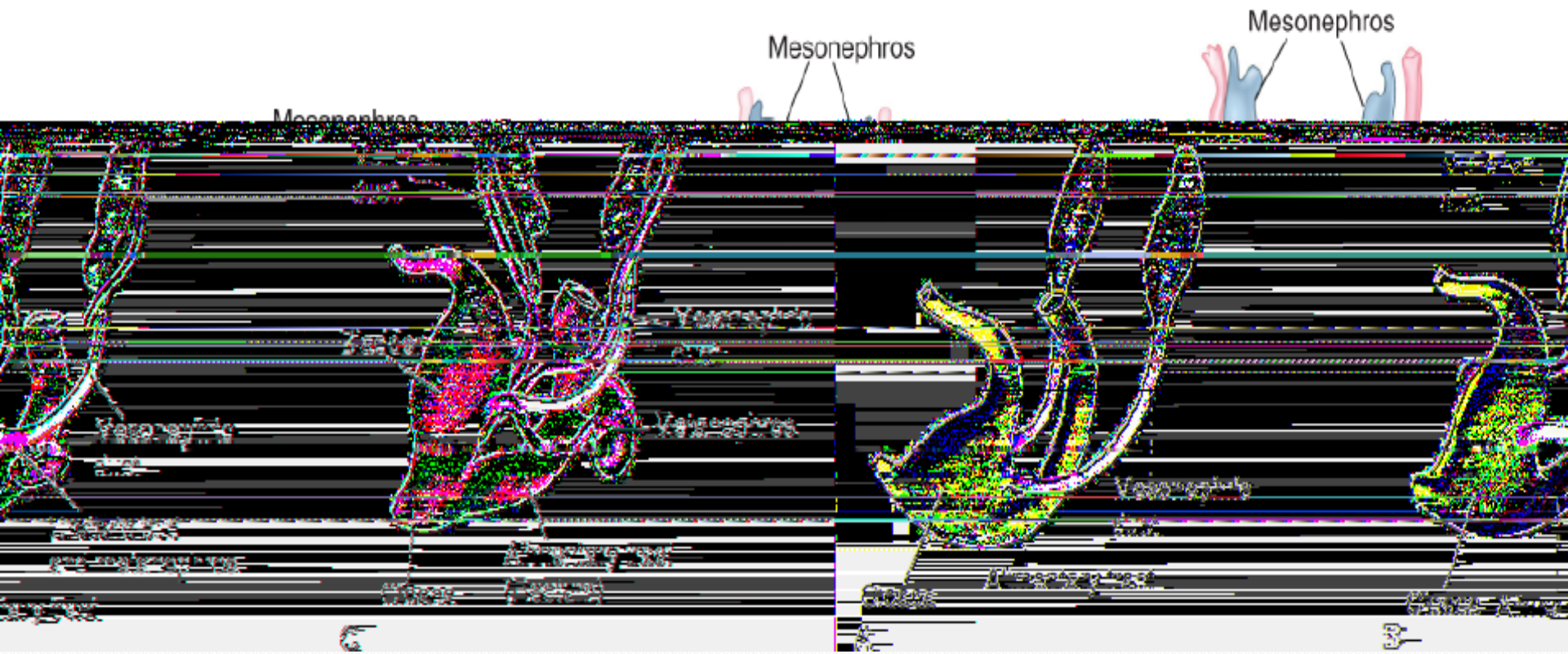
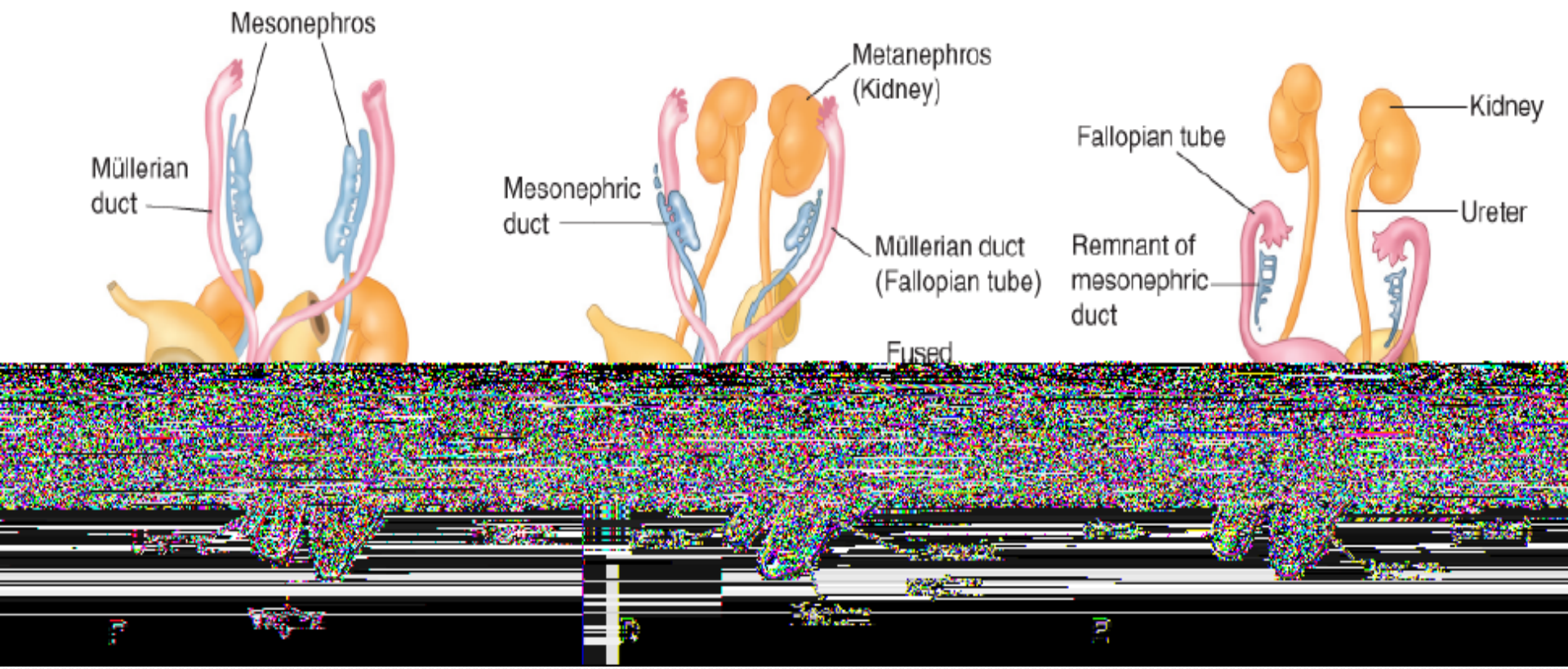
A. Cross-section of an embryo at 4 to 6 weeks. **B.** Large ameboid primordial germ cells migrate (*arrows*) from the yolk sac to the area of germinal epithelium, within the genital ridge. **C.** Migration of sympathetic cells from the spinal ganglia to a region above the developing kidney.



- The early urinary tract develops from the mesonephros and its mesonephric ducts (Fig. 3-2A). Recall that evolution of the renal system passes sequentially through the pronephric and mesonephric stages to reach the permanent metanephric system. Between the 4th and 5th weeks, each mesonephric duct gives rise to a ureteric bud, which grows cephalad toward its respective mesonephros (Fig. 3-2B).
- As each bud lengthens, it induces differentiation of the metanephros, which will become the final kidney (Fig. 3-2C). Each mesonephros degenerates near the end of the first trimester, and without testosterone, the mesonephric ducts regress as well.


Mesonephros
Mesonephros


Mesonephros
Müllerian duct
Metanephros (Kidney)
Mesonephric duct
Müllerian duct (Fallopian tube)
Fused
Fallopian tube
Kidney
Ureter
Remnant of mesonephric duct

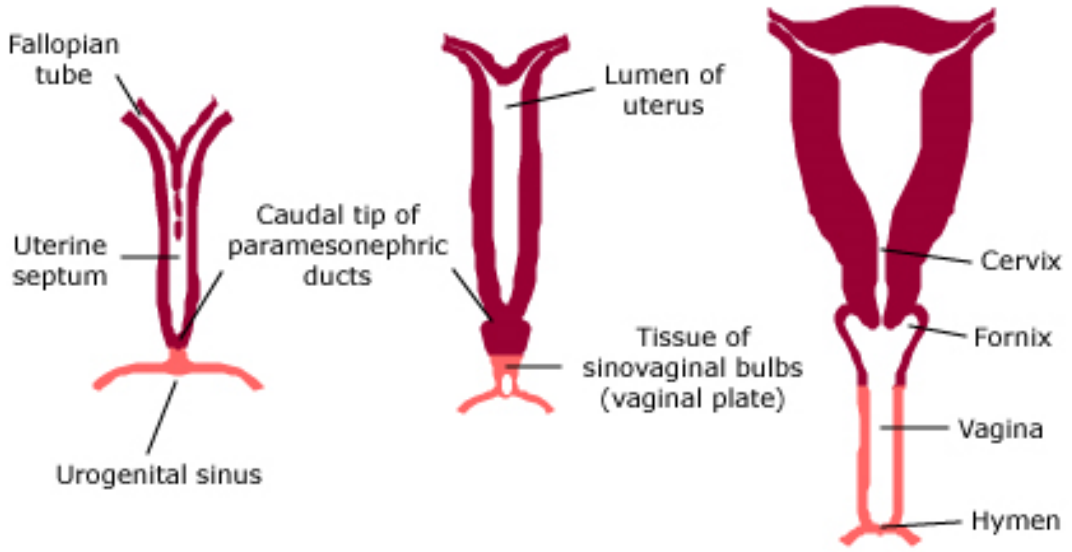
- The cloaca begins as a common opening for the embryonic urinary, genital, and alimentary tracts. By the 7th week it becomes divided by the urorectal septum to create the rectum and the urogenital sinus.
- The urogenital sinus is considered in three parts: (1) the cephalad or vesicle portion, which forms the urinary bladder; (2) the middle or pelvic portion, which creates the female urethra; and (3) the caudal or phallic part, which gives rise to the distal vagina and to the greater vestibular (Bartholin) and paraurethral glands.

Embryology of the Genital Tract

- The fallopian tubes, uterus, and upper vagina derive from the müllerian ducts, also termed paramesonephric ducts, which form adjacent to each mesonephros.
- These ducts extend downward and then turn medially to meet and fuse together in the midline. The uterus is formed by this union of the two müllerian ducts at approximately the 10th week. Fusion to create the uterus begins in the middle and then extends both caudally and cephalad. With cellular proliferation at the upper portion, a thick wedge of tissue creates the characteristic piriform uterine shape. At the same time, dissolution of cells at the lower pole forms the first uterine cavity.
- As the upper wedge-shaped septum is slowly reabsorbed, the final uterine cavity is usually formed by the 20th week.
- If the two müllerian ducts fail to fuse, then two separate uterine horns remain. In contrast, resorption failure of the common tissue between them results in various degrees of persistent uterine septum.

- As the distal end of the fused müllerian ducts contacts the urogenital sinus, this induces endodermal outgrowths from the sinus termed the sinovaginal bulbs. These bulbs proliferate and fuse to form the vaginal plate, which later resorbs to form the vaginal lumen.
- This vaginal canalization is generally completed by the 20th week. However, the lumen remains separated from the urogenital sinus by the hymeneal membrane. This membrane further degenerates to leave only the hymeneal ring.

Schematic diagram of the formation of the uterus and vagina



Left panel: At nine weeks, the uterine septum has disappeared.
Middle panel: At 13 weeks, the sinovaginal bulbs have begun to grow out of the pelvic part of the urogenital sinus and form a solid plate.
Right panel: In the newborn, the upper third of the vagina and the fornices are formed by vacuolization of the paramesonephric tissue, and the lower-thirds of the vagina is formed by vacuolization of the sinovaginal bulbs.

Adapted from Langman J, Medical Embryology, 4th ed, Williams & Wilkins, Baltimore, 1981. p. 253.

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- The close association of the mesonephric (wolffian) and paramesonephric (müllerian) ducts explains the simultaneous abnormalities in their end organs.
- Kenney and colleagues (1984) showed that up to half of females with uterovaginal malformations have associated urinary tract defects. Anomalies most frequently associated with renal defects are unicornuate uterus, uterine didelphys, and agenesis syndromes, whereas arcuate and bicornuate are less commonly linked.
- When müllerian anomalies are identified, the urinary system can be evaluated with magnetic resonance (MR) imaging, sonography, or intravenous pyelography.
- With müllerian anomalies, ovaries are functionally normal but have a higher incidence of anatomical maldescent into the pelvis.

- As discussed, the mesonephric ducts usually degenerate, however, persistent remnants may become clinically apparent. Mesonephric or wolffian vestiges can persist as Gartner duct cysts. These are typically located in the proximal anterolateral vaginal wall but may be found at other sites along the vaginal length.
- They can be further characterized by MR imaging, which provides excellent image resolution at soft tissue interfaces. Most cysts are asymptomatic and benign and usually do not require surgical excision.
- Intra abdominal wolffian remnants in the female include a few blind tubules in the mesovarium—the epoöphoron—and similar ones adjacent to the uterus—paroöphoron (see Fig. 3-2F) (Moore, 2013). The epoöphoron or paroöphoron may develop into clinically identifiable cysts in the adult.

MÜLLERIAN ABNORMALITIES

- (1) agenesis of both ducts, either focally or along the entire duct length;
- (2) unilateral maturation of one müllerian duct with incomplete or absent development of the opposite side;
- (3) absent or faulty midline fusion of the ducts;
- (4) defective canalization. American Fertility Society (1988) classification:
- groups with similar clinical characteristics, prognosis for pregnancy, and treatment. It also includes one for abnormalities associated with fetal exposure to diethylstilbestrol (DES).

Classification of Müllerian Anomalies

- I. Segmental müllerian hypoplasia or agenesis
- a. Vaginal
- b. Cervical
- c. Uterine fundal
- d. Tubal
- e. Combined anomalies

- II. Unicornuate uterus
- a. Communicating rudimentary horn
- b. Noncommunicating horn
- c. No endometrial cavity
- d. No rudimentary horn

- III. Uterine didelphys

- IV. Bicornuate uterus
- a. Complete—division to internal os
- b. Partial

- V. Septate uterus
- a. Complete—septum to internal os
- b. Partial

- VI. Arcuate
- VII. Diethylstilbestrol related

Classification of Müllerian anomalies according to the American Fertility Society classification system

Type I: "Müllerian" agenesis or hypoplasia
A. Vaginal (uterus may be normal or exhibit a variety of malformations)
B. Cervical
C. Fundal
D. Tubal
E. Combined
Type II: Unicornuate uterus
A1a. Communicating (endometrial cavity present)
A1b. Noncommunicating (endometrial cavity present)
A2. Horn without endometrial cavity
B. No rudimentary horn
Type III: Uterus didelphys
Type IV: Uterus bicornuate
A. Complete (division down to internal os)
B. Partial
C. Arcuate
Type V: Septate uterus
A. Complete (septum to internal os)
B. Partial
Type VI: Diethylstibestrol-related anomalies
A. T-shaped uterus
B. T-shaped with dilated horns

Reproduced with permission from: American Fertility Society (AFS). The American Fertility Society classifications of adnexal adhesions,distal tubal occlusion secondary to tubal ligation, tubal pregnancies, Müllerian anomalies and intrauterine adhesions. Fertil Steril 1988;49:944. Copyright © 1988 American Society for Reproductive Medicine.

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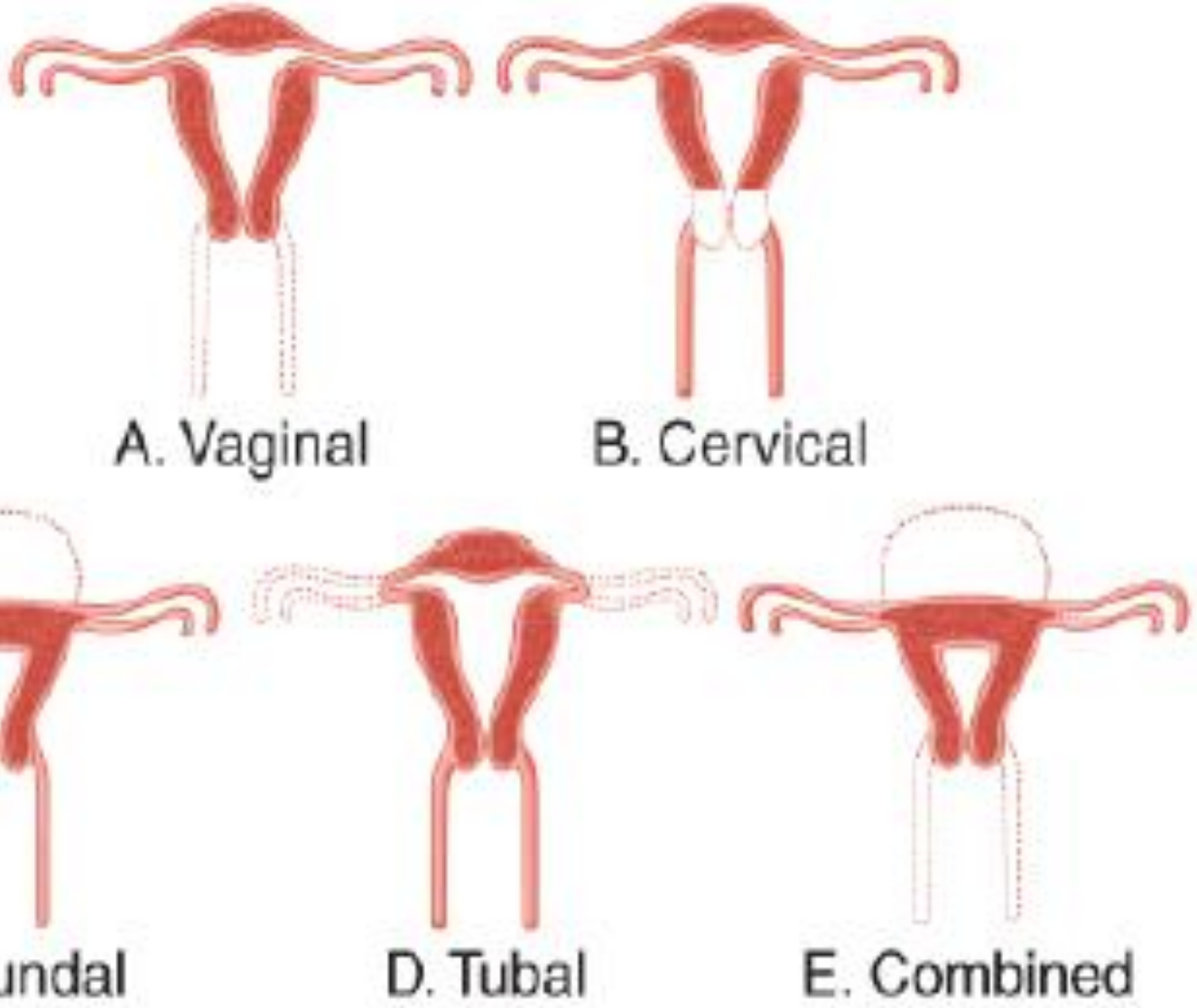
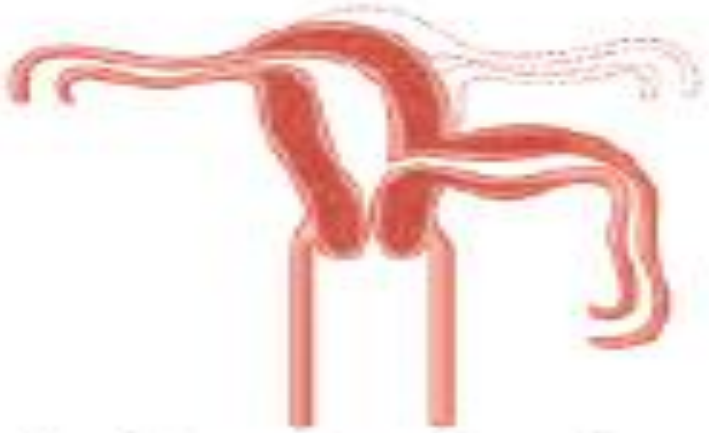
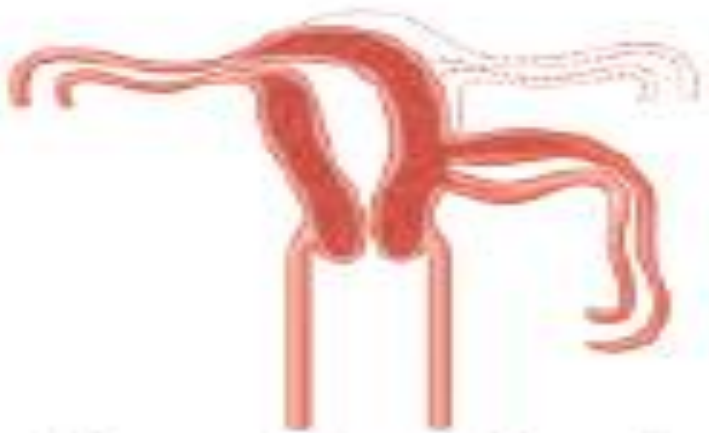
I. Hypoplasia/agenesis



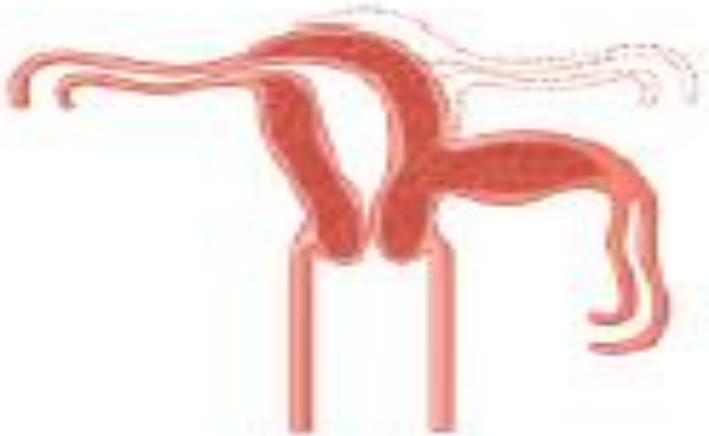
II. Unicornuate



A. Communicating



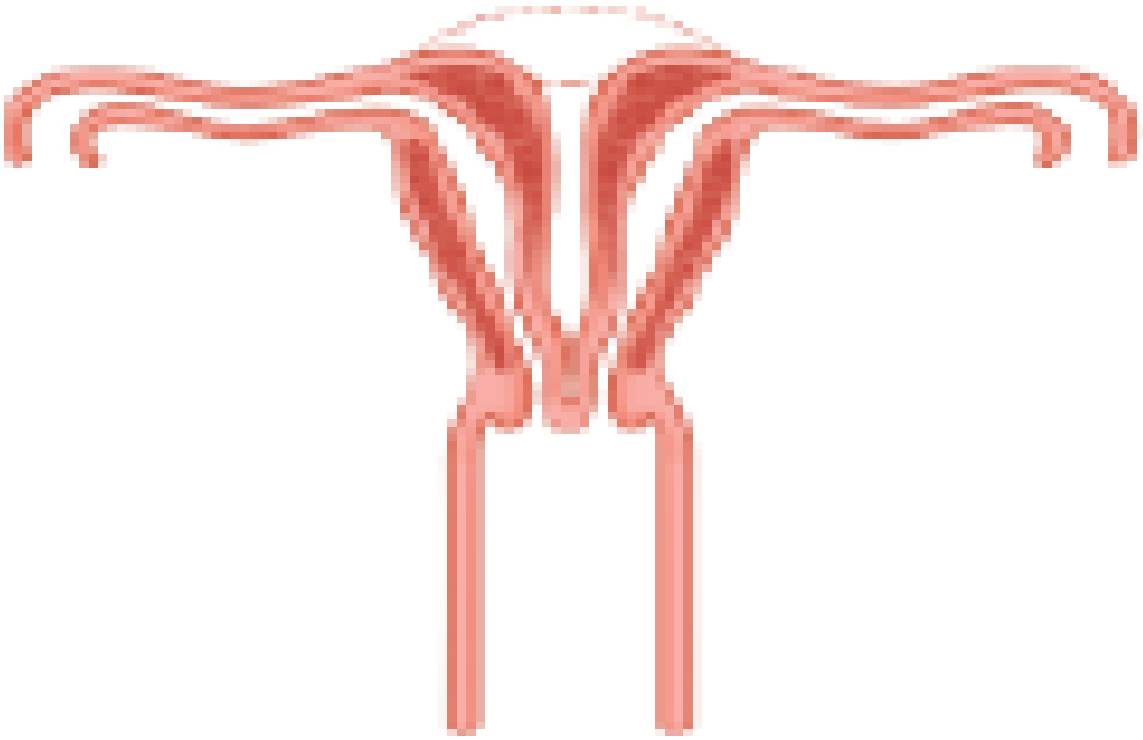
B. Noncommunicating



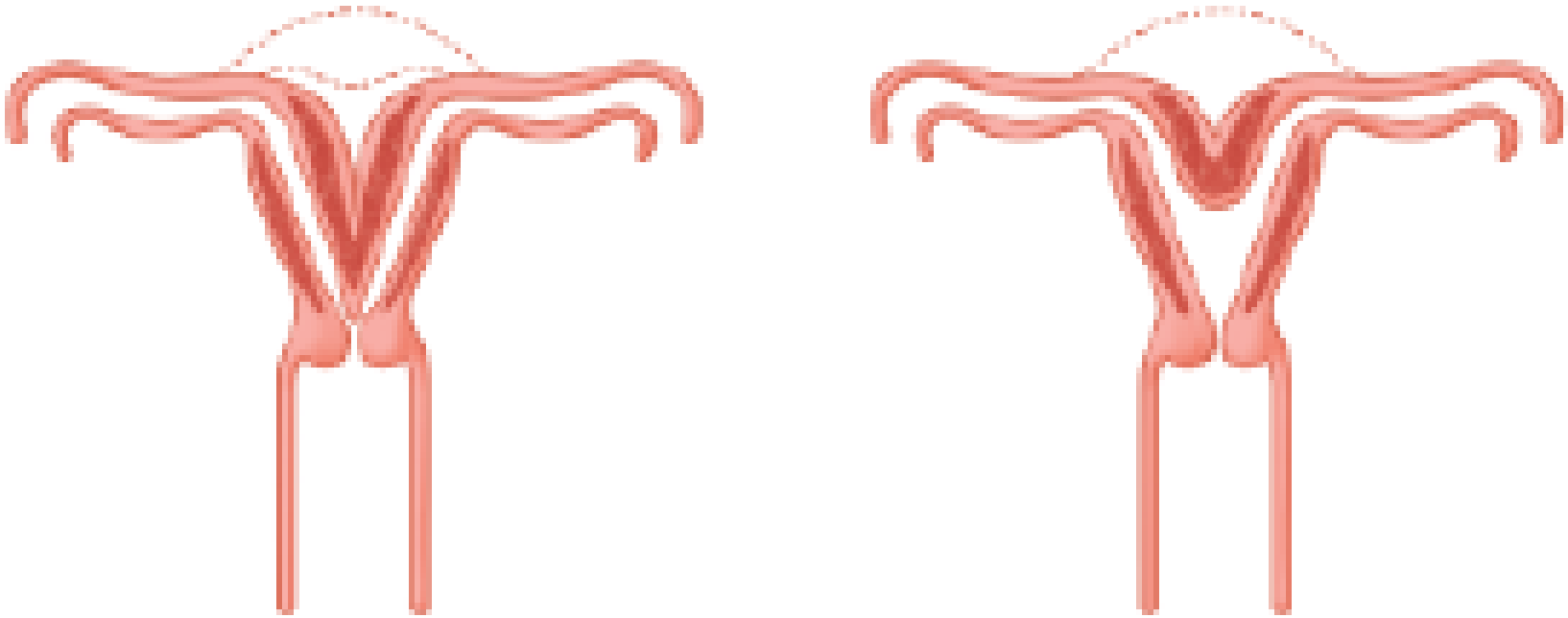
C. No cavity

D. No horn

III. Didelphys



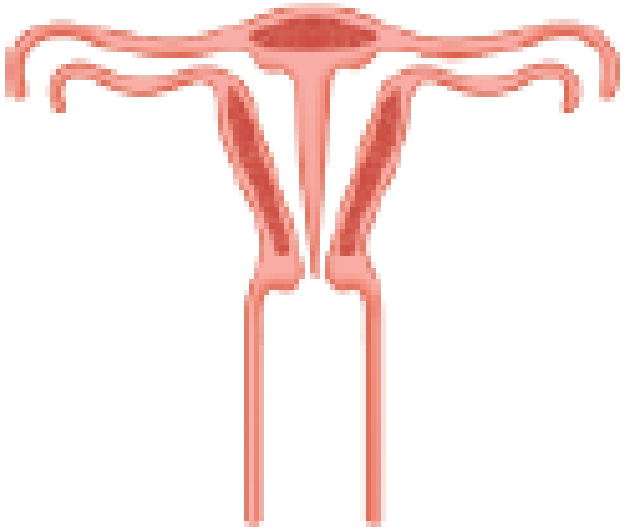
IV. Bicornuate



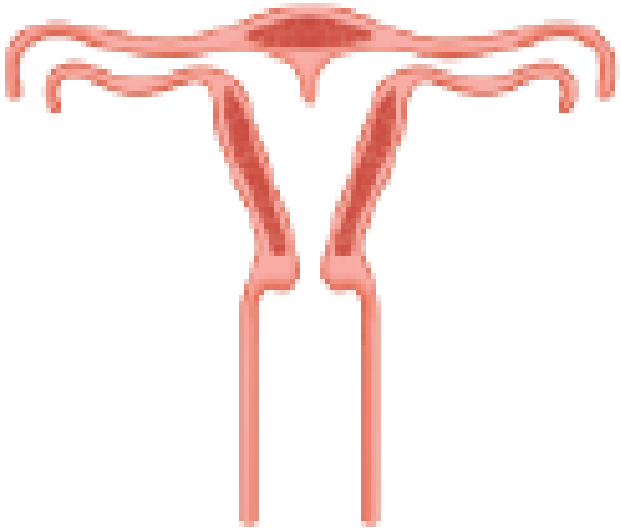
A. Complete

B. Partial

V. Septate

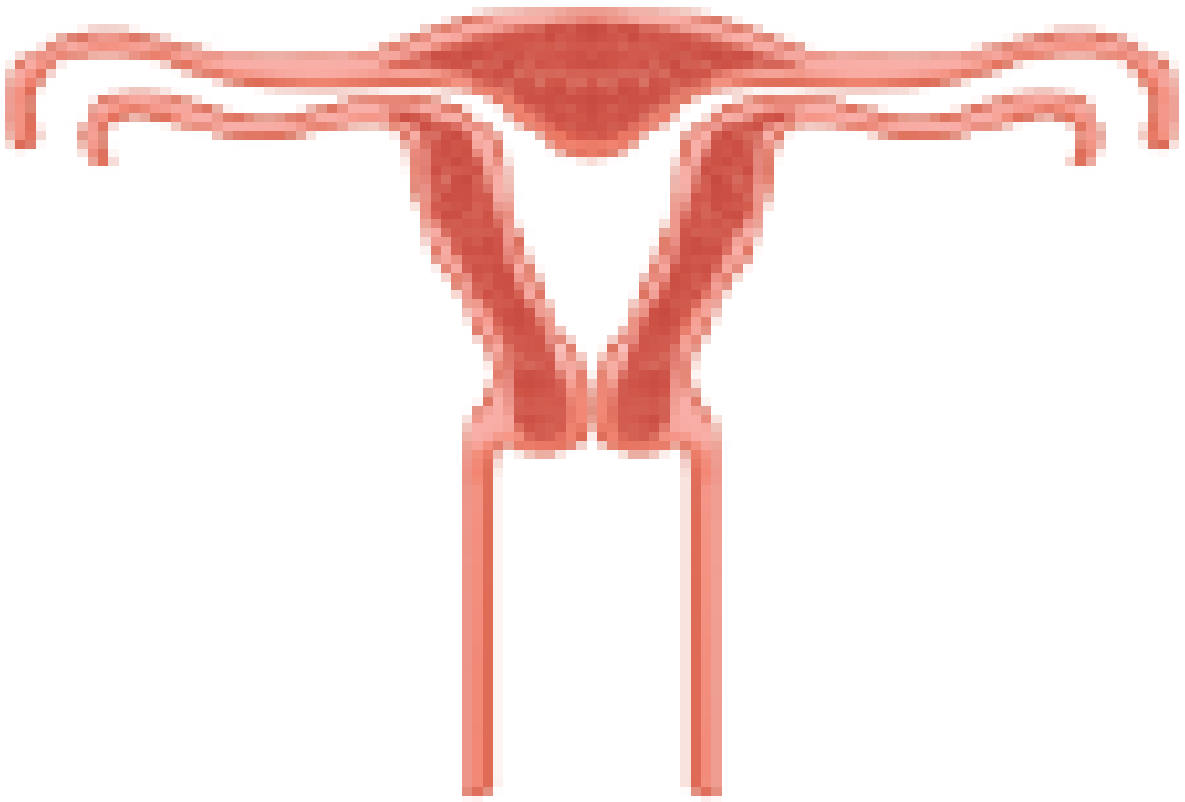


A. Complete

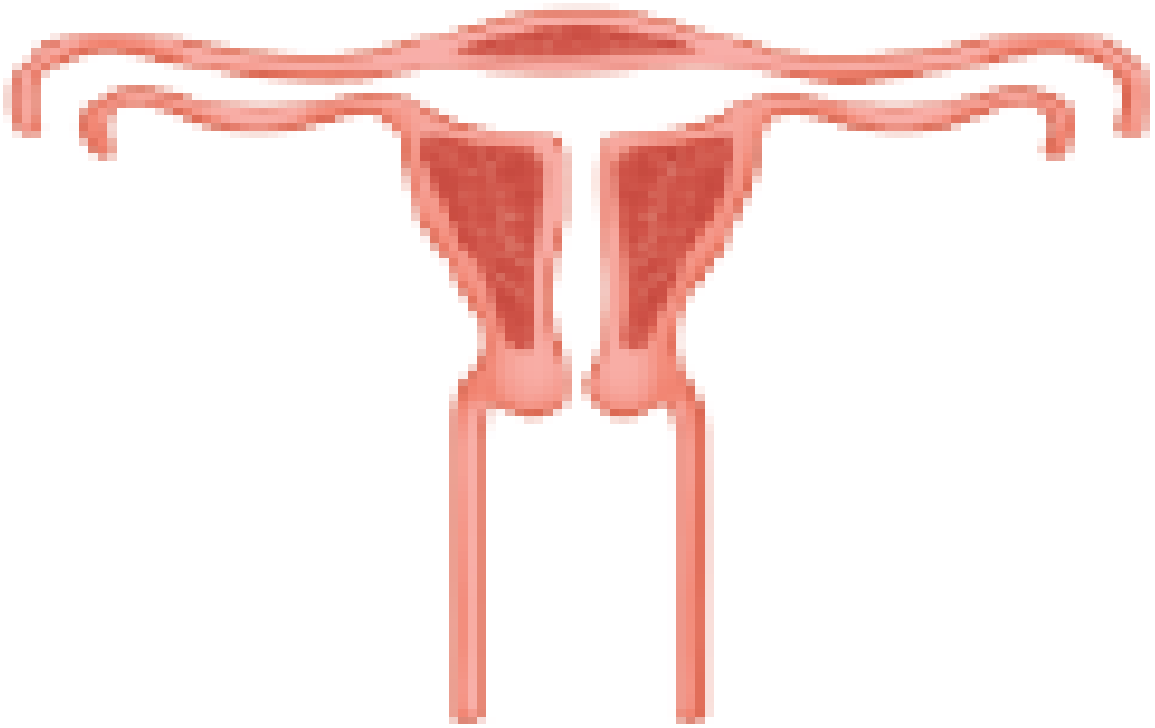


B. Partial

VI. Arcuate



VII. DES related



Mullerian uterine anomalies

TABLE 5
THE AMERICAN FERTILITY SOCIETY CLASSIFICATION OF MULLERIAN ANOMALIES

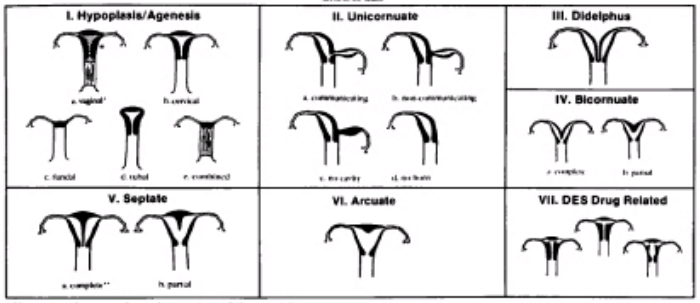
Patient's Name _____ Date _____ Chart # _____

Age _____ G _____ P _____ Sp Ab _____ VTP _____ Ectopic _____ Infertile Yes _____ No _____

Other Significant History (i.e. surgery, infection, etc.) _____

HSG _____ Sonography _____ Photography _____ Laparoscopy _____ Laparotomy _____

EXAMPLES



* Uterus may be normal or take a variety of abnormal forms.
** May have two distinct cervices

Type of Anomaly

Class I _____ Class V _____
Class II _____ Class VI _____
Class III _____ Class VII _____
Class IV _____

Treatment (Surgical Procedures): _____

Prognosis for Conception & Subsequent Viable Infant*

_____ Excellent (> 75%)
_____ Good (50-75%)
_____ Fair (25%-50%)
_____ Poor (< 25%)

*Based upon physician's judgment.

Recommended Followup Treatment: _____

Additional Findings: _____

Vagina: _____
Cervix: _____
Tubes: Right _____ Left _____
Kidneys: Right _____ Left _____

DRAWING
L R

For additional supply contact:
American Society for Reproductive Medicine
1209 Montgomery Highway
Birmingham, AL 35216-2809
Tel: 205-978-5000 • Fax: 205-978-5018

Reproduced with permission from: The American Fertility Society classifications of adnexal adhesions, distal tubal occlusion, tubal occlusion secondary to tubal ligation, tubal pregnancies, mullerian anomalies and intrauterine adhesions. Fertil Steril 1988; 49:944.

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Female genital tract anomalies: ESHRE ESGE classification system

Uterine anomaly			Cervical/vaginal anomaly	
	Main class	**Sub-class**	**Co-existent class**	
U0	Normal uterus		C0	Normal cervix
U1	Dysmorphic uterus	a. T-shaped b. Infantilis c. Others	C1	Septate cervix
U2	Septate uterus	a. Partial b. Complete	C2	Double 'normal' cervix
U3	Bicorporeal uterus	a. Partial b. Complete c. Bicorporeal septate	C3	Unilateral cervical aplasia
U4	Hemi-uterus	a. With rudimentary cavity (communicating or not horn) b. Without rudimentary cavity (horn without cavity/no horn)	C4	Cervical aplasia
			V0	Normal vagina
U5	Aplastic	a. With rudimentary cavity (bi- or unilateral horn) b. Without rudimentary cavity (bi- or unilateral uterine remnants/ aplasia)	V1	Longitudinal non-obstructing vaginal septum
			V2	Longitudinal obstructing vaginal septum
			V3	Transverse vaginal septum and/or imperforate hymen
U6	Unclassified malformations		V4	Vaginal aplasia

Female genital tract anomalies: ESHRE ESGE classification system

Uterine anomaly			Cervical/vaginal anomaly	
	Main class	**Sub-class**	**Co-existent class**	
U0	Normal uterus		C0	Normal cervix
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U4	Hemi-uterus	a. With rudimentary cavity (communicating or not horn) b. Without rudimentary cavity (horn without cavity/no horn)	C4	Cervical aplasia
U5	Aplastic	a. With rudimentary cavity (bi- or unilateral horn) b. Without rudimentary cavity (bi- or unilateral uterine remnants/ aplasia)	V0	Normal vagina
U6	Unclassified malformations		V1	Longitudinal non-obstructing vaginal septum
			V2	Longitudinal obstructing vaginal septum
			V3	Transverse vaginal septum and/or imperforate hymen
			V4	Vaginal aplasia

U **C** **V**

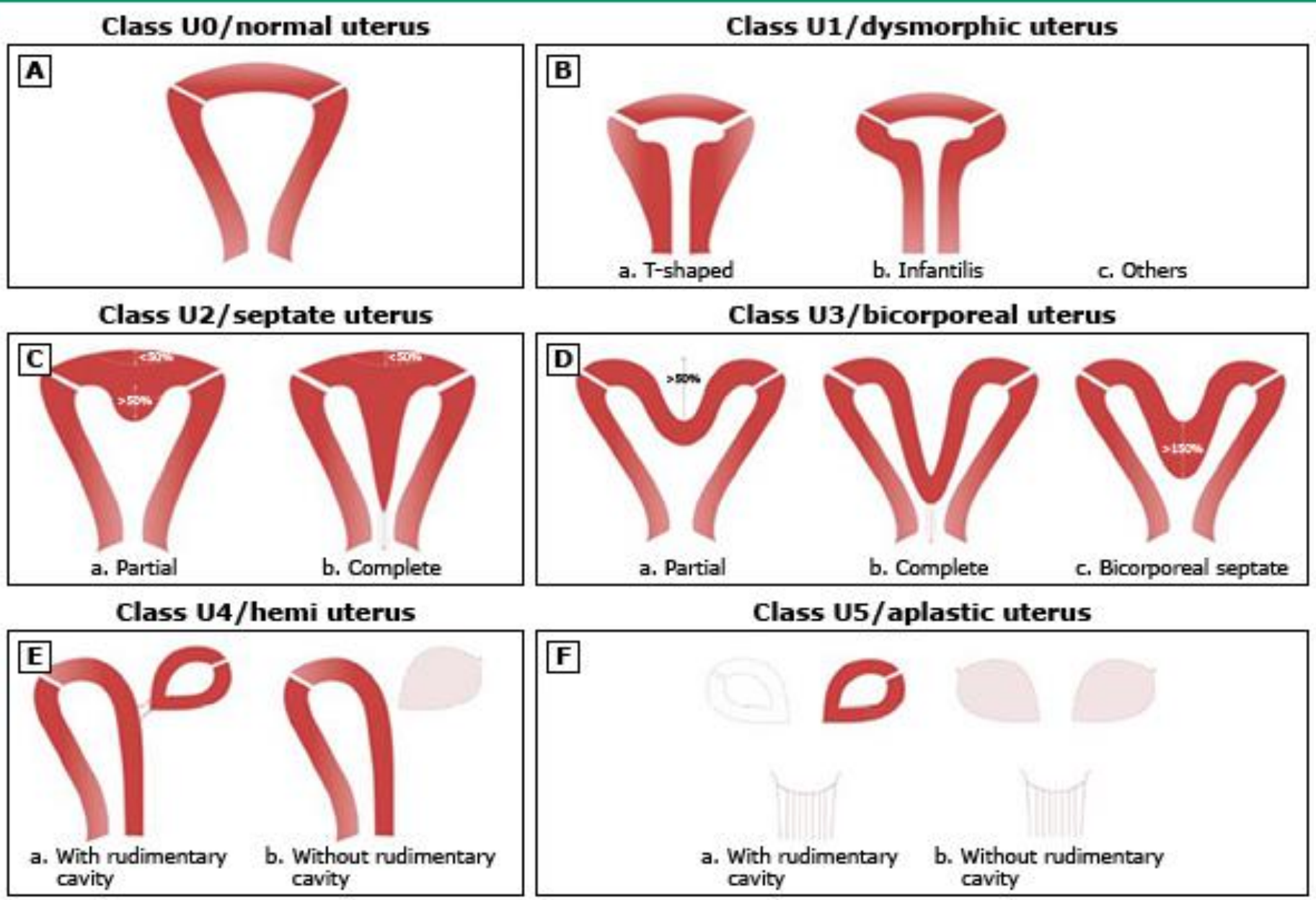
Associated anomalies of non-Müllerian origin:

Drawing of the anomaly

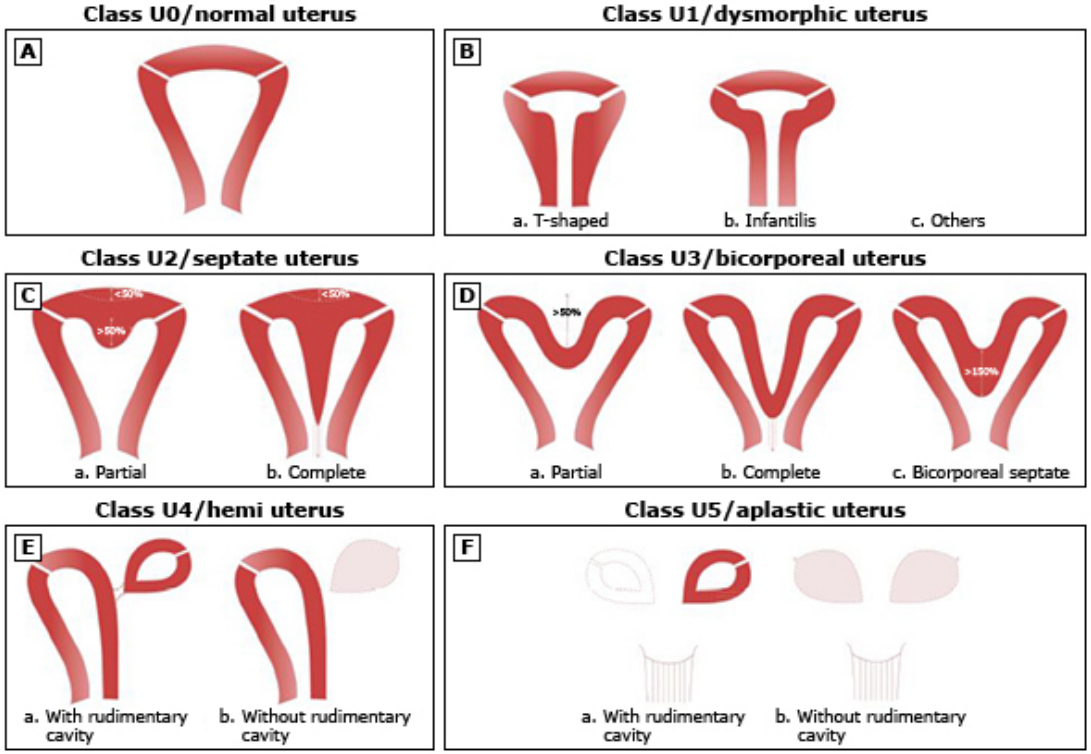
Scheme for the classification of female genital tract anomalies according to the new ESHRE/ESGE classification system.

ESHRE: European Society of Human Reproduction and Embryology; ESGE: European Society for Gynaecological Endoscopy.

Female genital tract anomalies: ESHRE ESGE classification system



Female genital tract anomalies: ESHRE ESGE classification system



ESHRE/ESGE classification of uterine anomalies: schematic representation. (Class U2: internal indentation >50 percent of the uterine wall thickness and external contour straight or with indentation <50 percent; Class U3: external indentation >50 percent of the uterine wall thickness; Class U3b: width of the fundal indentation at the midline >150 percent of the uterine wall thickness.)

ESHRE: European Society of Human Reproduction and Embryology; ESGE: European Society for Gynaecological Endoscopy.

Acien classification of genital tract anomalies

Agenesis or hypoplasia of the entire urogenital ridge
Unicornuate uterus with uterine, tubal, ovarian, and renal agenesis on the contralateral side
Mesonephric anomalies with absence of both opening of the Wolffian duct to the urogenital sinus and ureteral bud sprouting leading to utero-vaginal duplicity and a blind hemivagina ipsilateral with renal agenesis
Unilateral hematocolpos
Gartner's pseudocyst on the anterolateral wall of the vagina
Partial reabsorption of intervaginal septum
Vaginal or complete cervico-vaginal unilateral agenesis, ipsilateral with the renal agenesis, and (1) with no communication, or (2) with communication between both hemiuteri
Isolated Müllerian anomalies
Müllerian ducts: unicornuate (generally, with rudimentary uterine horn), bicornuate, septate and didelphys uterus.
Müllerian tubercle: cervico-vaginal atresia and segmentary anomalies such as transverse vaginal septum.
Müllerian tubercle and ducts: (uni- or bilateral) Mayer-Rokitansky-Kuster-Hauser syndrome.
Anomalies of the urogenital sinus
Cloacal anomalies etc.
Malformative combinations
Wolffian, Müllerian, and cloacal anomalies.

Adapted from: Acién P, Acién M, Sánchez-Ferrer M. Complex malformations of the female genital tract. New types and revision of classification. Human Reproduction 2004; 19:2377.

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PREVALENCE

- the prevalence of CUAs was 5.5% in an unselected population,
- 8% in infertile women,
- 12.3% in women with a history of miscarriage,
- and 24.5% in women with miscarriage and infertility [9].
- The prevalence of CUAs in women with primary infertility is not increased; it is approximately the same as that in fertile women with normal reproductive outcomes [12].

Frequency of specific CUAs in affected women

- septate (35 percent),
- bicornuate (26 percent),
- arcuate (18 percent),
- unicornuate (10 percent),
- didelphys (8 percent),
- agenesis (3 percent)

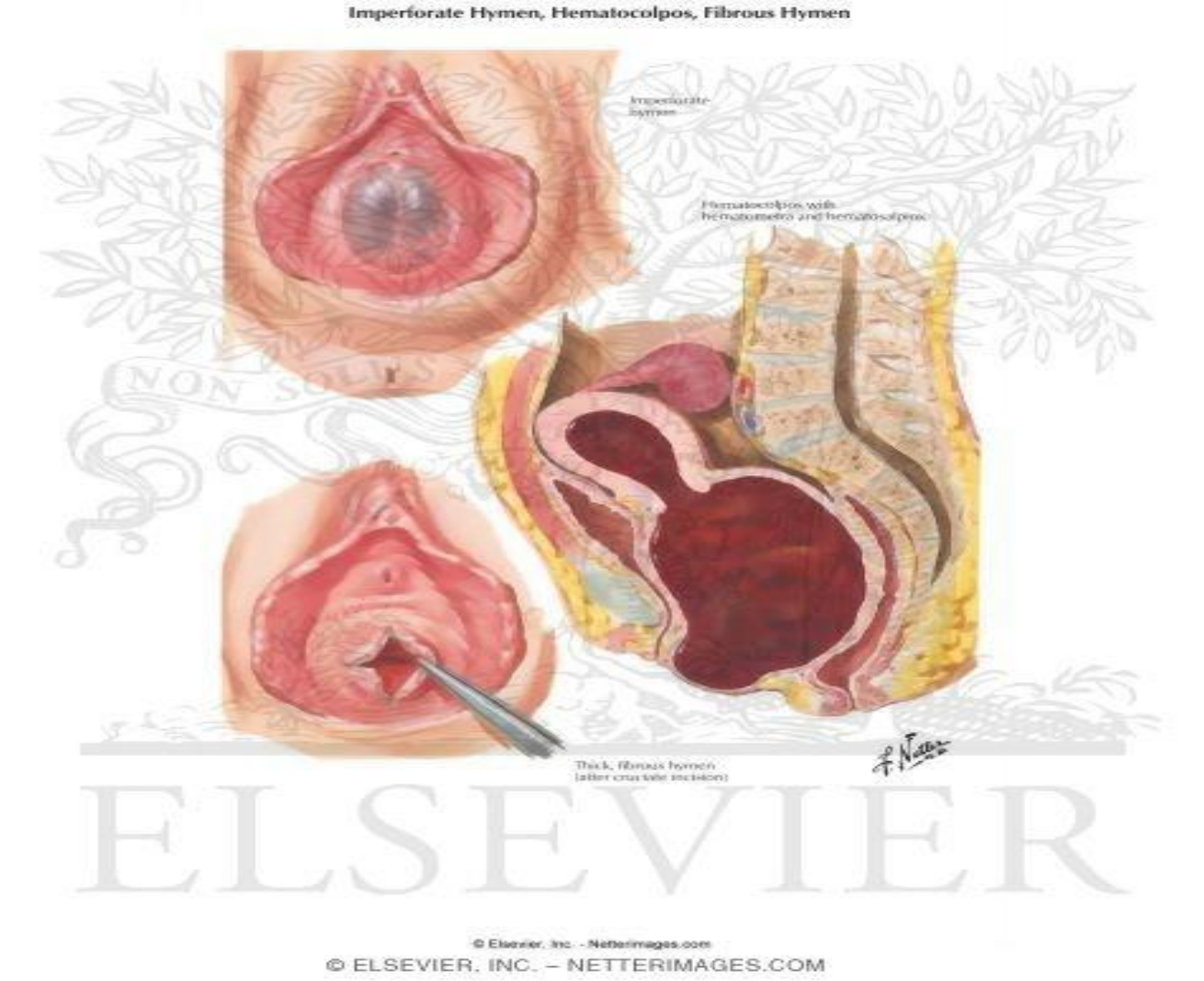
ASSOCIATED ANOMALIES IN OTHER ORGAN SYSTEMS

- Women with CUAs are at increased risk of having renal, skeletal, or abdominal wall abnormalities, or a history of inguinal hernia, and vice versa.
- Renal anomalies are found in 20 to 30 percent of women with Müllerian defects [7,8]. Duplex collecting system, horseshoe kidney, pelvic kidney, and unilateral renal agenesis have been associated with an obstructed hemiuterus, obstructed hemivagina, and transverse vaginal septa.

Congenital anomalies of the hymen and vagina

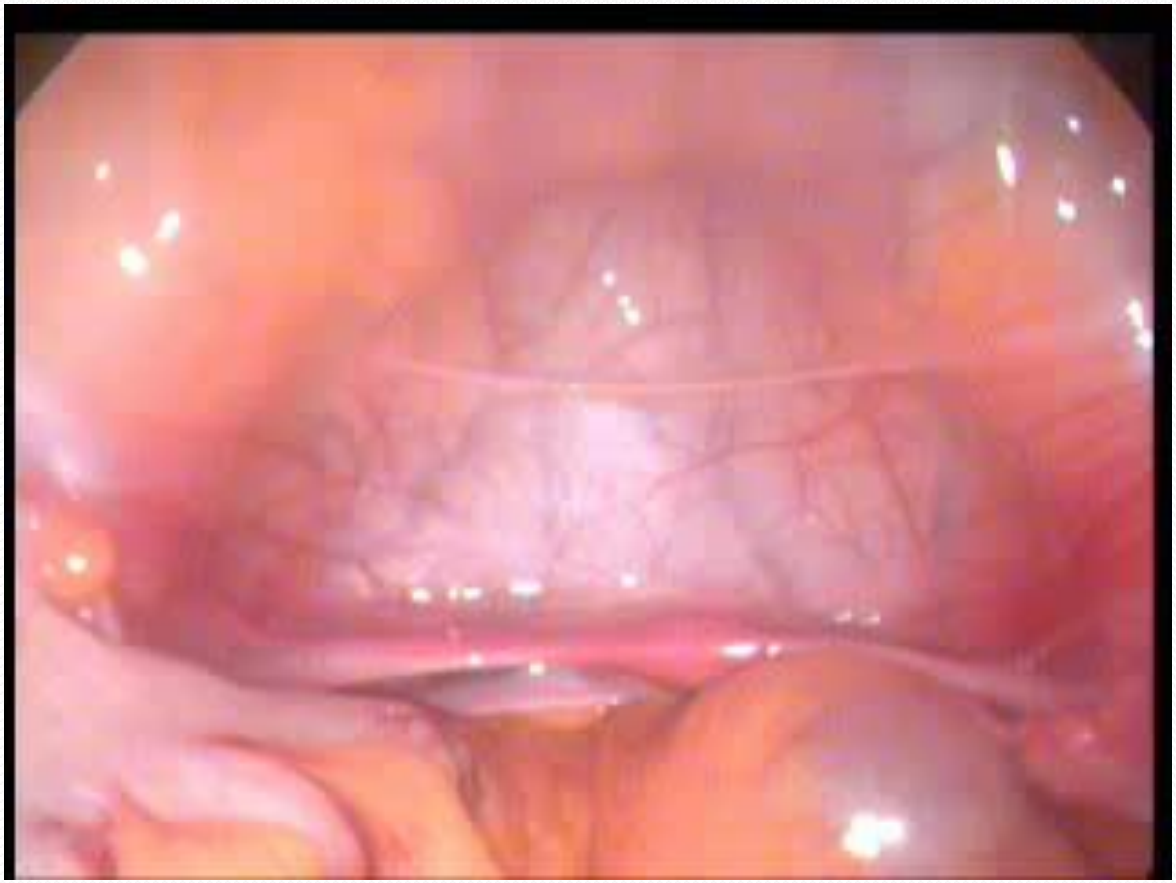
- Development of the female genital tract is a complex process that is dependent upon a series of events involving cellular differentiation, migration, fusion, and canalization. Failure of any one of these processes results in a congenital anomaly.
- Anomalies of the hymen and vagina may interfere with menstruation, sexual activity, fertility, or childbirth. These typically present after puberty, but are discovered during the neonatal period in some infants

Imperforated hymen



Vaginal Abnormalities

- vaginal agenesis : Mayer- Rokitansky-Küster-Hauser (MRKH) syndrome, in which upper vaginal agenesis is typically associated with uterine hypoplasia or agenesis. Less often, this syndrome also displays abnormalities of the renal, skeletal, and auditory systems. This triad is known by the acronym MURCS, which reflects müllerian duct aplasia, renal aplasia, and cervicothoracic somite dysplasia
- Uterine transplantation is currently experimental but holds future promise for these women.



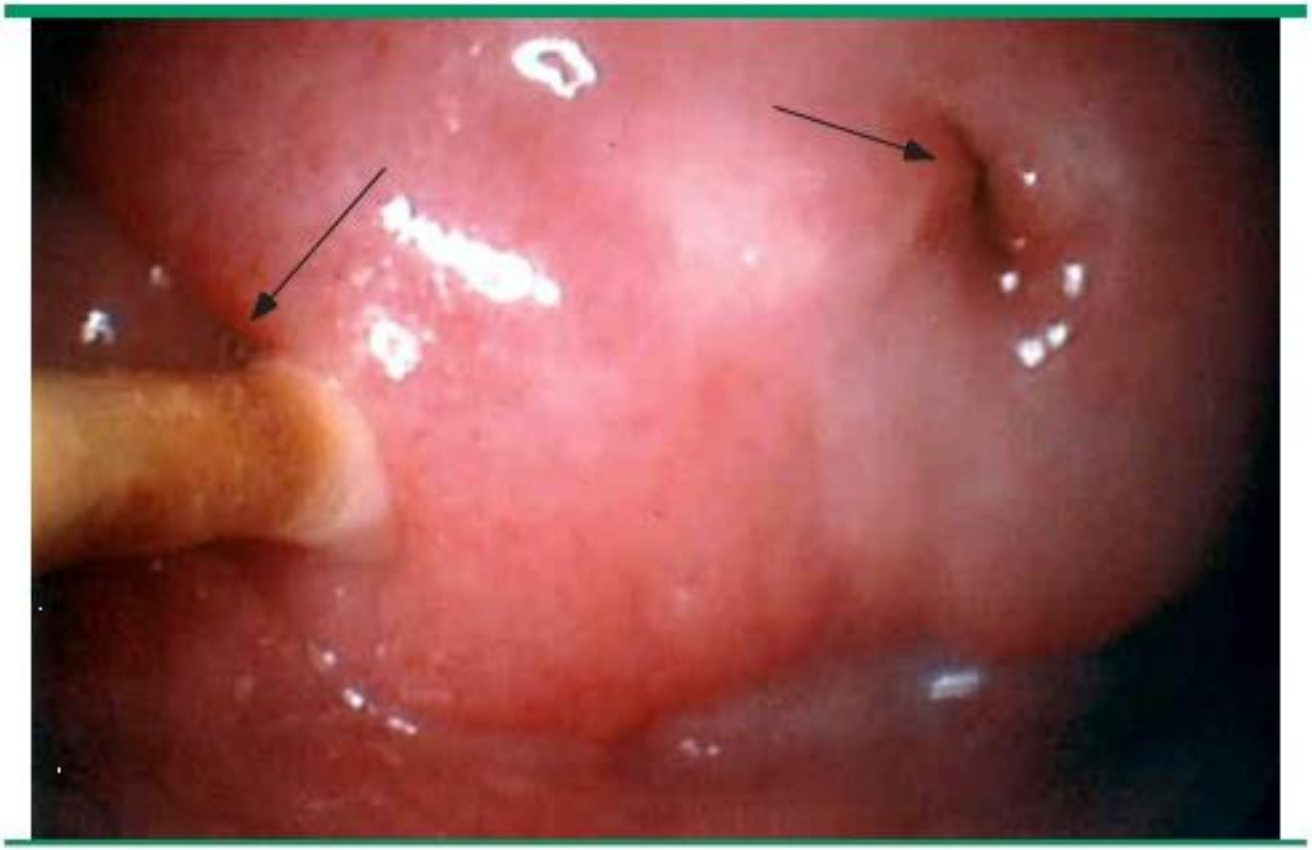
- congenital septa may form longitudinally or transversely, and each can arise from a fusion or resorption defect. Longitudinal septa divide the vagina into right and left portions.

- A transverse septum poses an obstruction of variable thickness. It may develop at any depth within the vagina, but most are in the lower third.
- obstruction or infertility is variably present.

Cervical Abnormalities

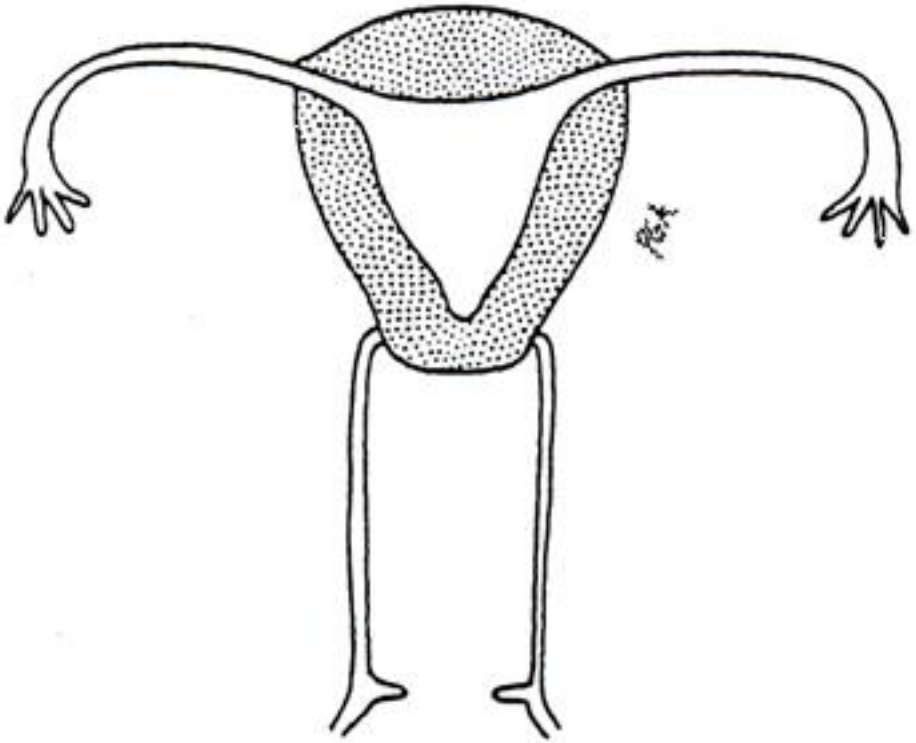
- Developmental anomalies:
- partial or complete agenesis
- duplication
- longitudinal septa.

Uterus with two cervices (bicollis)



Two cervical os from uterus didelphys are visible (arrows).

Cervical agenesis with the presence of a vagina



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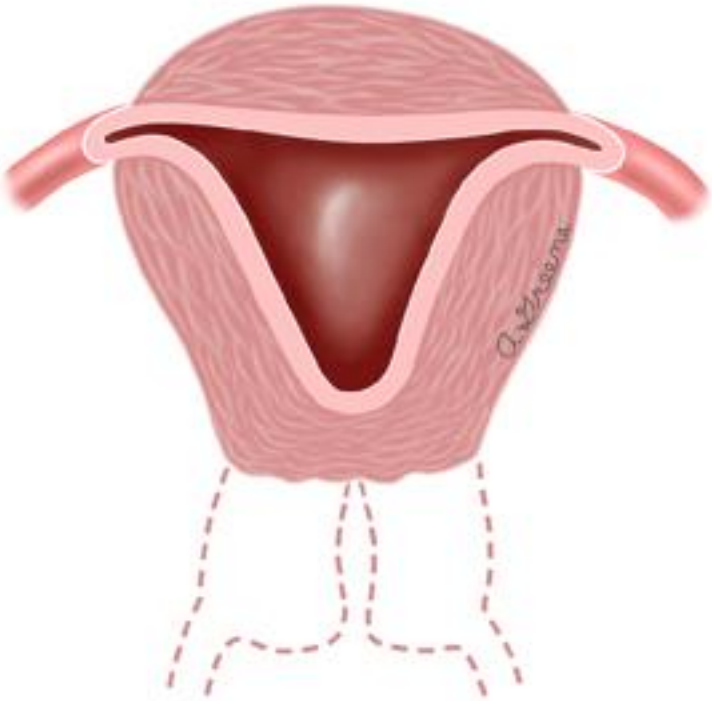
Cervical agenesis



The fundus of the uterus is present without the body of the cervix. Dotted lines represent missing cervix and upper vagina.

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- Uncorrected complete agenesis is incompatible with pregnancy, and IVF & gestational surrogacy is an option.
- Surgical correction by uterovaginal anastomosis has resulted in successful pregnancy (Kriplani, 2012).
- Significant complications for this reason, they recommend hysterectomy for complete cervical agenesis and reserve reconstruction attempts for carefully selected patients with cervical dysgenesis

Uterine Abnormalities

- the prevalence found with imaging ranges from 0.4 to 10 percent.
- In a general population, the most common finding is arcuate uterus, followed in descending order by septate, bicornuate, didelphic, and unicornuate classes.
- Müllerian anomalies may be discovered during pelvic examination, cesarean delivery, tubal sterilization, or infertility evaluation.
- Depending on clinical presentation, diagnostic tools may include sonography, HSG, MRI, laparoscopy, and hysteroscopy.

- In most clinical settings 2-D TVS is initially performed.
- the pooled accuracy for TVS is 90 to 92%
- Saline infusion sonography (SIS) improves delineation of the endometrium for a patent endometrial cavity.
- 3-D sonography is more accurate than 2-D sonography because it provides uterine images from virtually any angle.

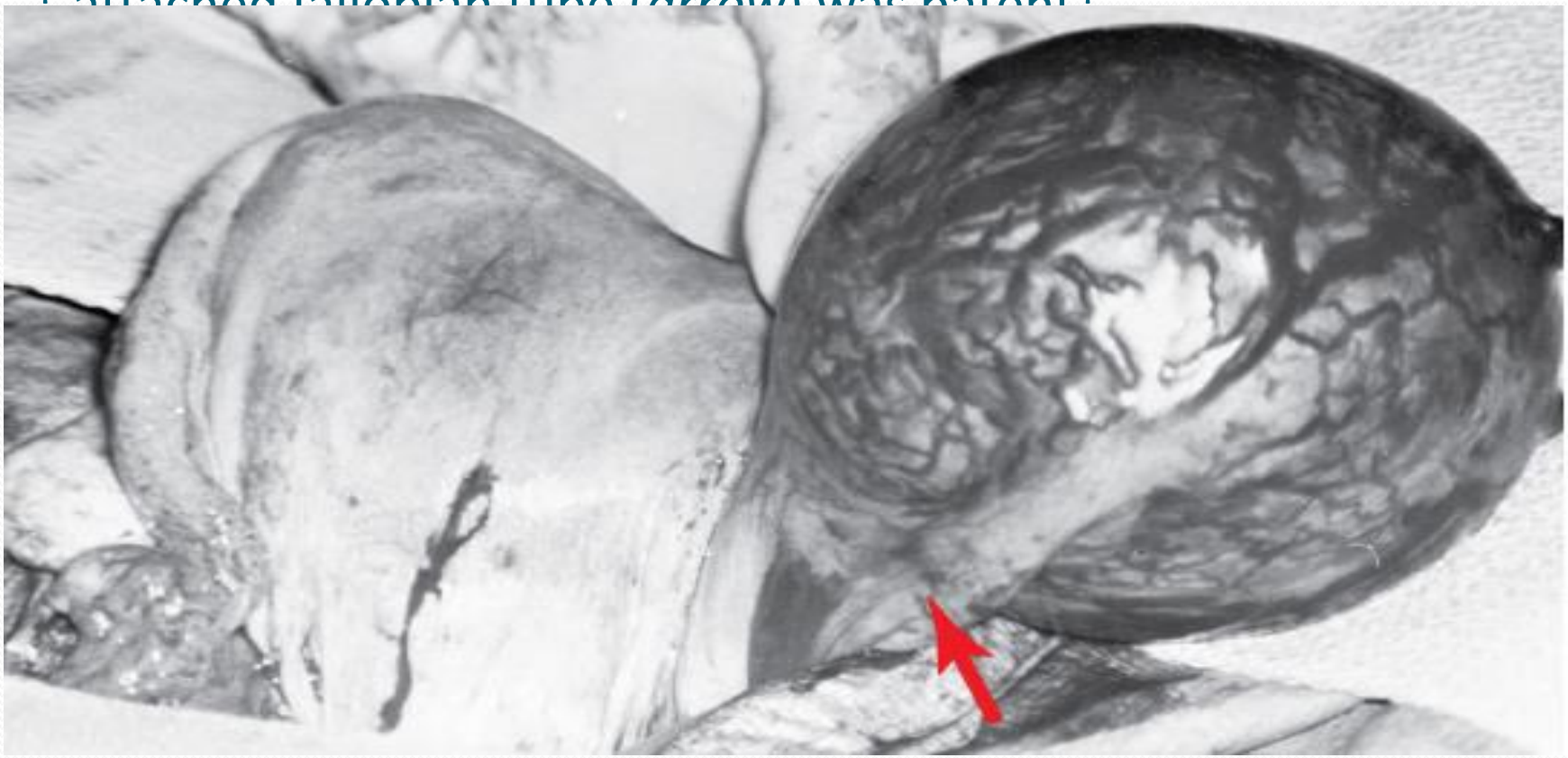
- MRI: preferred for complex anatomy, especially cases for which corrective surgery is planned.
- accuracy of up to 100% for müllerian anomaly
- renal or skeletal anomalies can be concurrently evaluated.

Unicornuate Uterus (Class II)

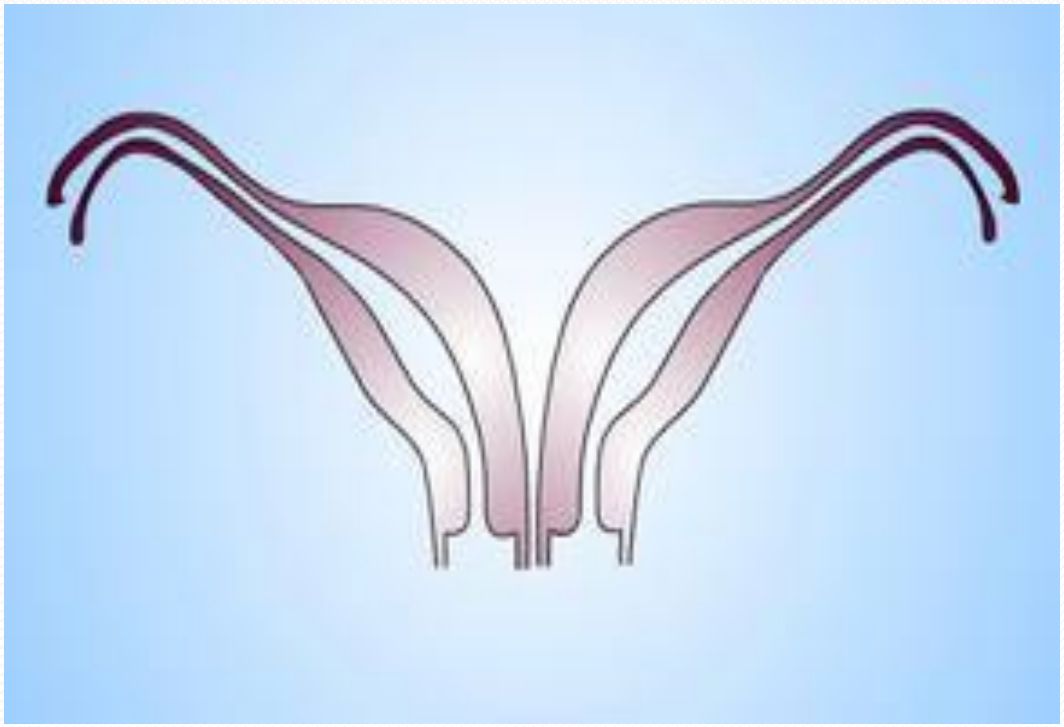
- Look for the underdeveloped or rudimentary horn
- If present, it may or may not communicate with the dominant horn and may or may not contain an endometrium-lined cavity
- General population estimates cite an incidence of 1 in 4000 women
- 40% of affected women will have renal anomalies
- significant obstetrical risks, including first- and second-trimester miscarriage, malpresentation, IUGR, fetal demise, PROM, PTB
- Rudimentary horns also increase the risk for an ectopic pregnancy within the remnant. prophylactic excision of a horn that has a cavity. (in pregnancy: MTX or surgically before rupture)
- subsequent pregnancy after excision are scarce. In one series of eight women, all had a preterm cesarean delivery

NONCOMMUNICATING RUDIMENTARY UTERINE HORN

* attached fallopian tube (arrow) was patent*



Uterine Didelphys (Class III)

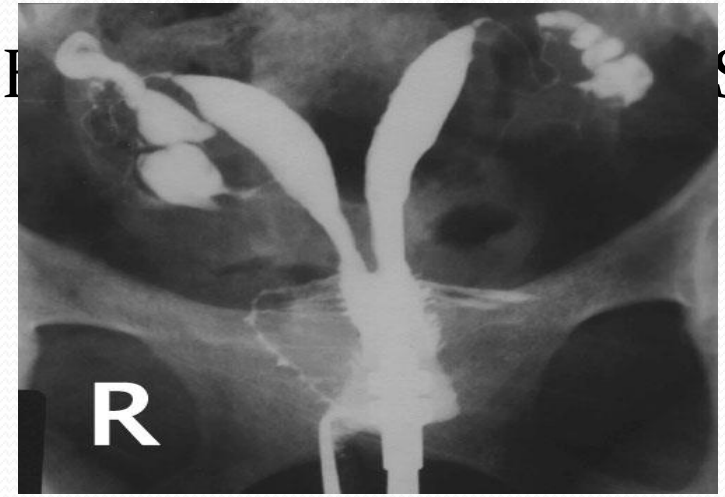


- complete lack of fusion that results in two entirely separate hemiuteri, cervices, and usually two vaginas
- It is common among marsupials, for example, the American possum—Didelphys virginiana. Most women have a double vagina or a longitudinal vaginal septum. Uterine didelphys may be isolated. Or, it may compose a triad with an obstructed hemivagina and with ipsilateral renal agenesis (OHVIRA), also known as Herlyn- Werner-Wunderlich syndrome (Tong, 2013).
- PE: longitudinal vaginal septum and two cervices.
- HSG: two separate endocervical canals. These open into separate noncommunicating fusiform endometrial cavities that each ends with a solitary fallopian tube.

- 2- or 3-D TVS: separate divergent uterine horns with a large intervening fundal cleft are seen. Endometrial cavities are uniformly separate.
- MRI: valuable in cases without classic findings.
- Adverse obstetrical outcomes : similar but less frequent than those seen with unicornuate uterus. Increased risks include miscarriage, preterm birth, and malpresentation.
- Metroplasty for either uterine didelphys or bicornuate uterus involves resection of intervening myometrium and fundal recombination (Alborzi, 2015).
- for highly selected patients with otherwise unexplained miscarriages. Moreover, no evidence-based data confirm the efficacy of such surgical repair.

IMAGING MODALITIES IN DIDELPHYS UTERUS

H SG



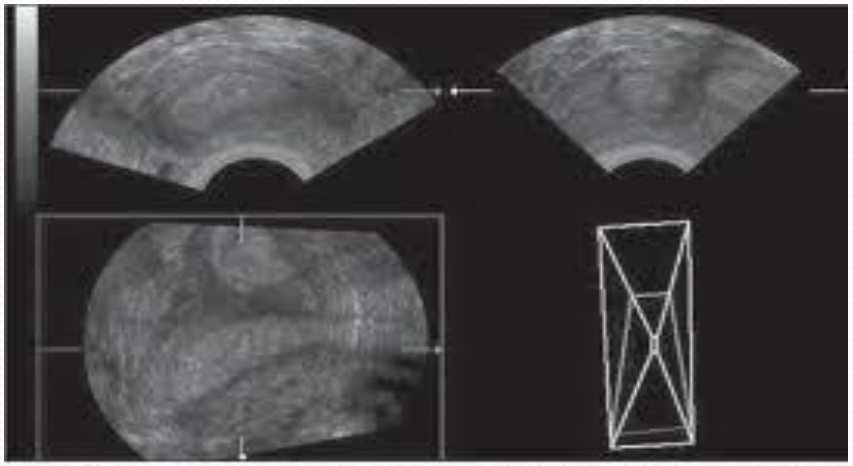
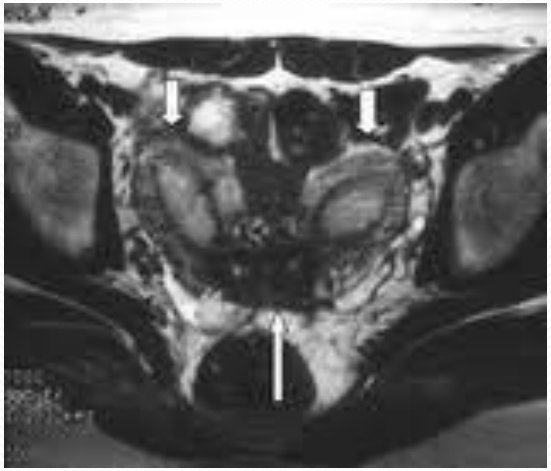
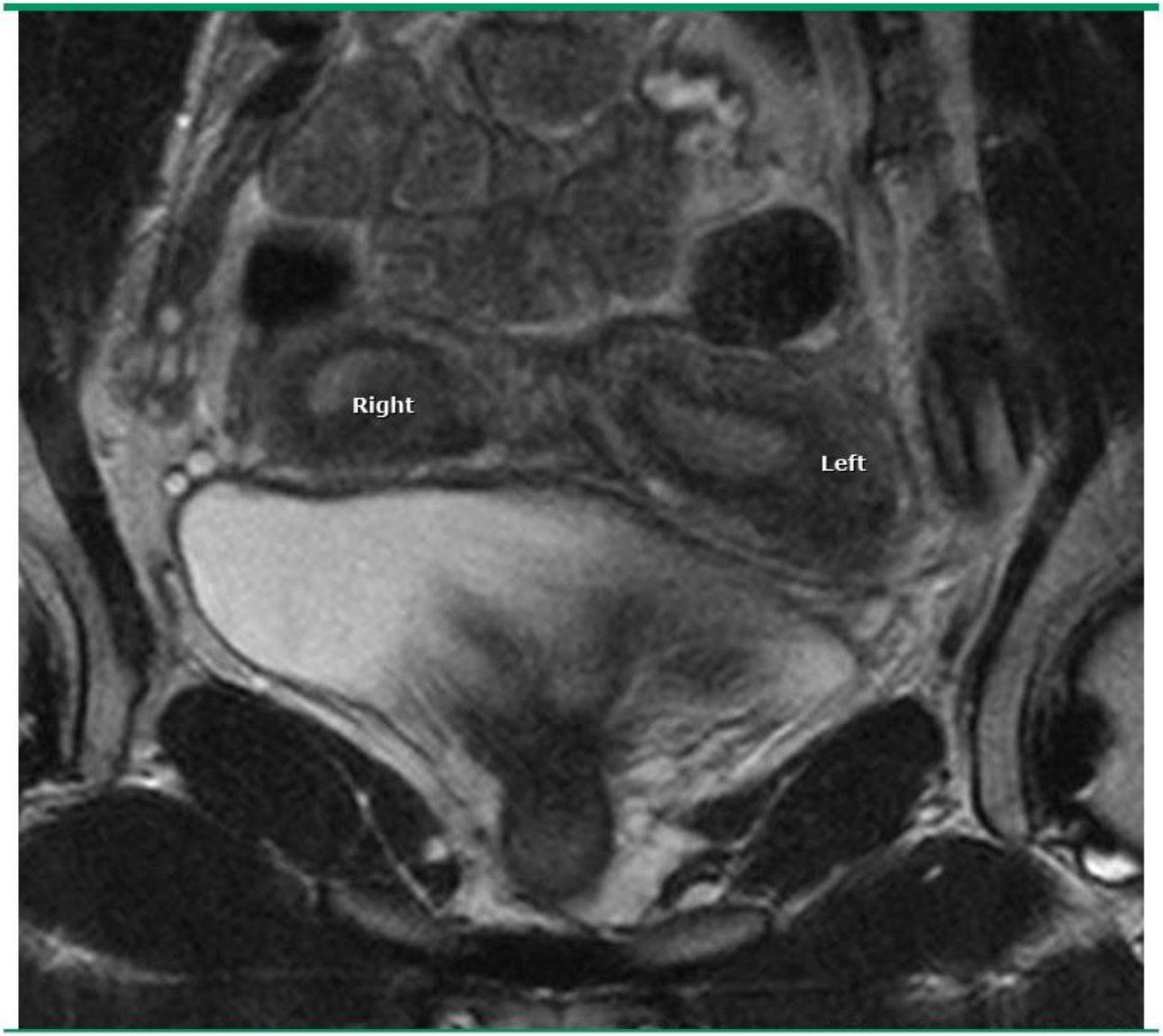


Figure 21. Double cavity uterus. Final diagnosis: bicornuate uterus. Transvaginal 3D multiplanar ultrasound. Observe asymmetrical endometrial cavities.



Magnetic resonance image uterus didelphys



Oblique coronal T2-weighted magnetic resonance image shows separate right and left uterine horns of uterus didelphys.

Courtesy of Deborah Levine, MD.

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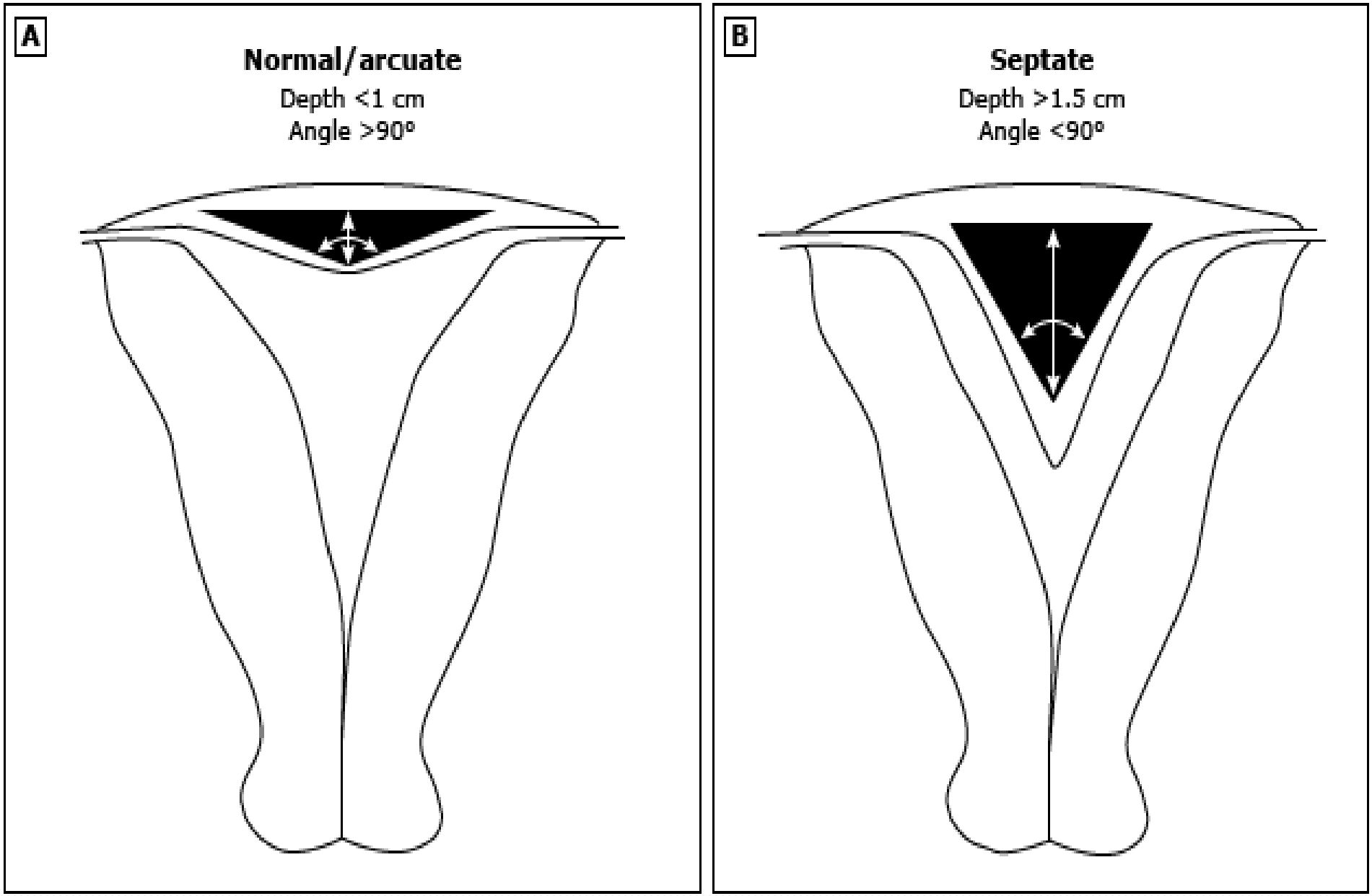
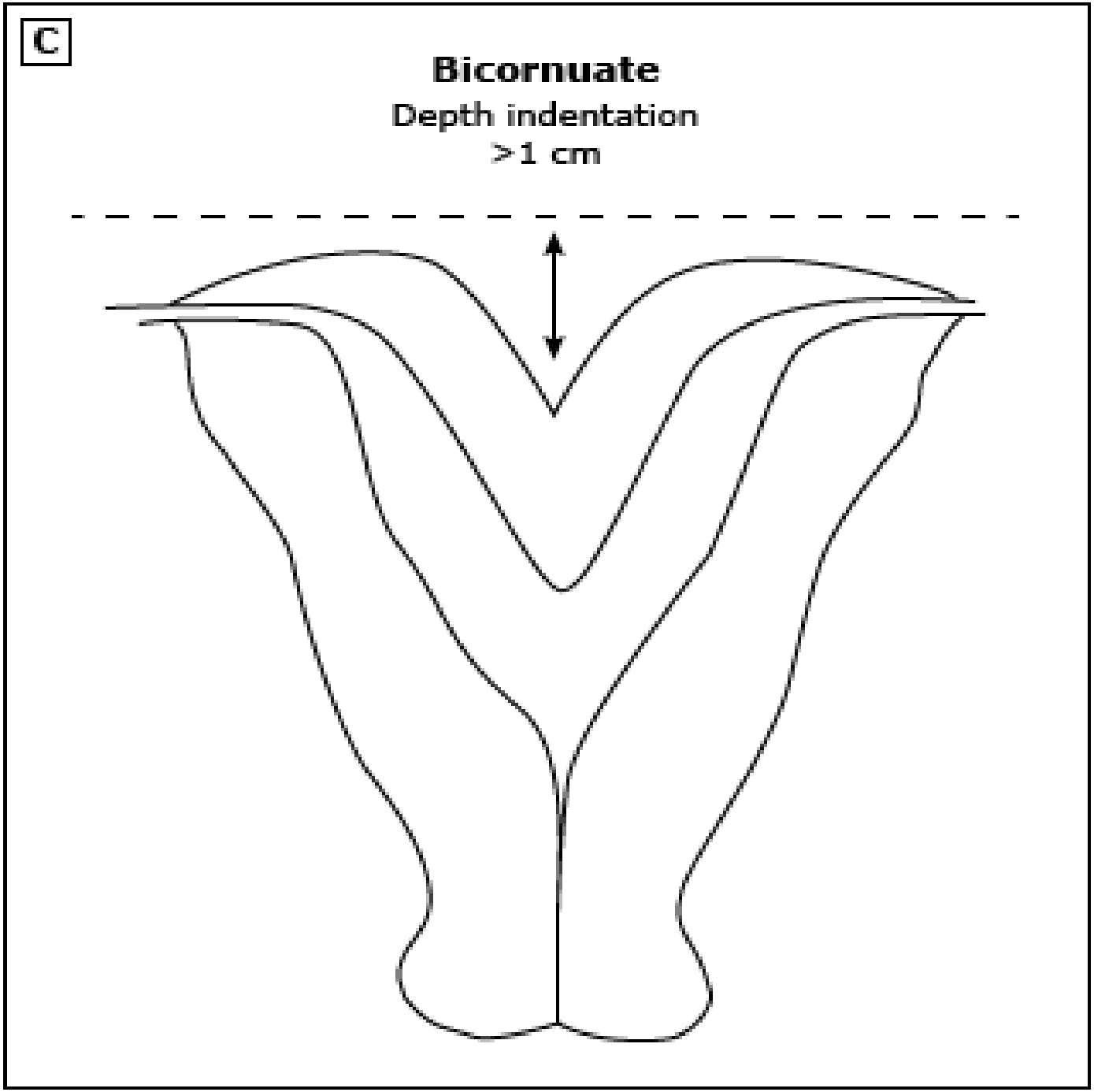
Bicornuate Uterus (Class IV)

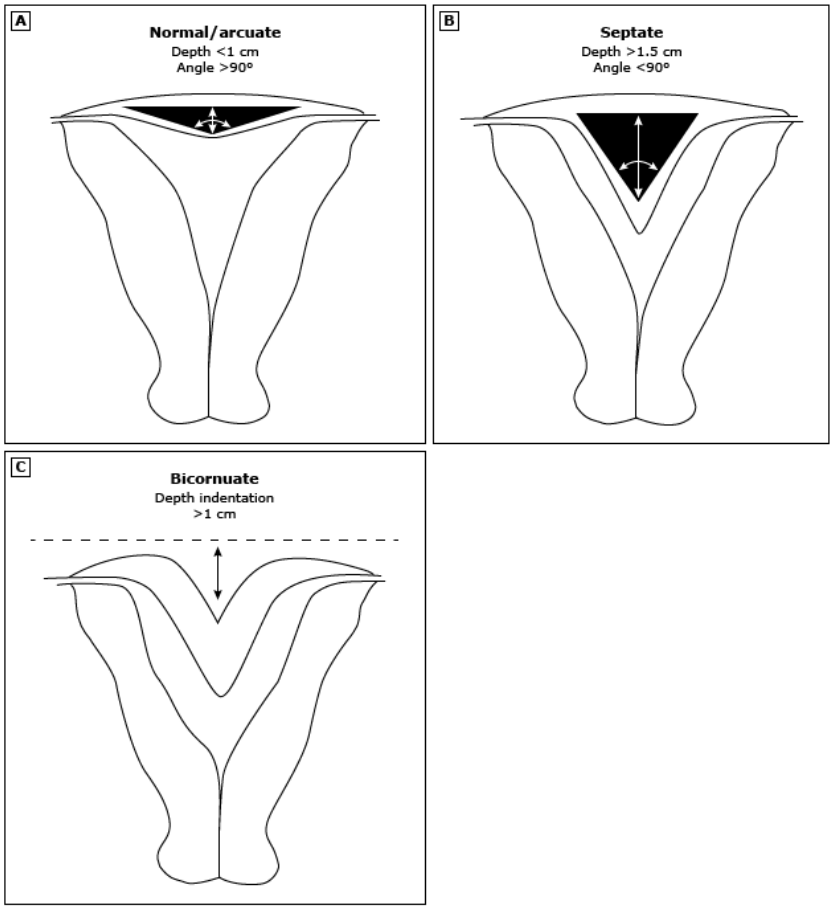
- fusion anomaly : two hemiuteri.
- a single cervix (bicornuate unicollis) or reach the external os (bicornuate bicollis). a coexistent longitudinal vaginal septum is not uncommon.
- Radiological discrimination of a bicornuate uterus from a septate uterus can be challenging.
- important because septate uterus can be treated with hysteroscopic septal resection.
- With these, an intercornual angle greater than 105 degrees typifies a bicornuate uterus, whereas one less than 75 degrees indicates a septate uterus.
- an intrafundal downward cleft measuring ≥1 cm or more is indicative of bicornuate uterus. A septate uterus shows a cleft depth <1 cm, or it may have a normal fundal contour.
- adverse obstetrical outcomes: miscarriage, PTB, and malpresentation.
- metroplasty is reserved for highly selected patients.

ASRM uterine septum guideline





ASRM uterine septum guideline

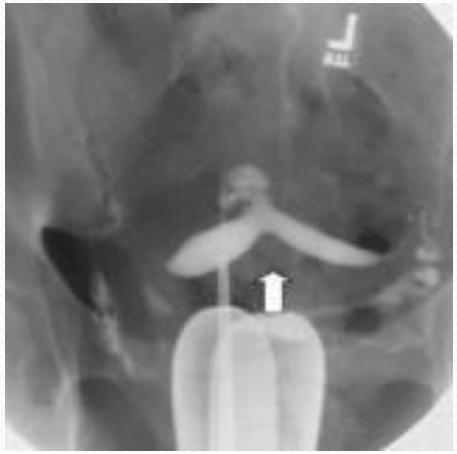


Diagrams of the ASRM definitions of normal/arcuate (A), septate (B), and bicornuate (C) uterus based on assessment of available literature, understanding that these anomalies reflect points on a spectrum of development.
(A) Normal/arcuate: depth from the interstitial line to the apex of the indentation <1 cm and angle of the indentation >90 degrees.
(B) Septate: depth from the interstitial line to the apex of the indentation >1.5 cm and angle of the indentation <90 degrees.
(C) Bicornuate: external fundal indentation >1 cm. Internal endometrial cavity is similar to a partial septate uterus.

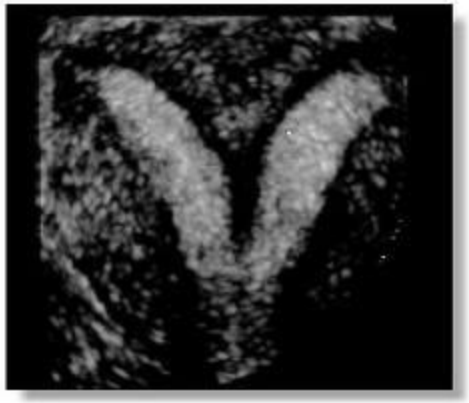
ASRM: American Society for Reproductive Medicine.

IMAGING MODALITIES IN BICORNUATE UTERUS

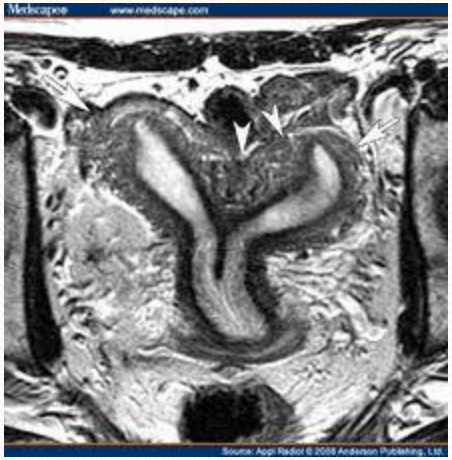
HSG



3D USG

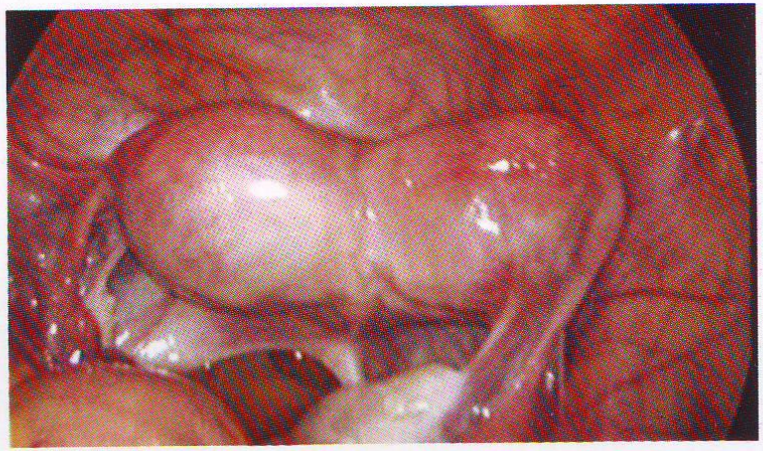


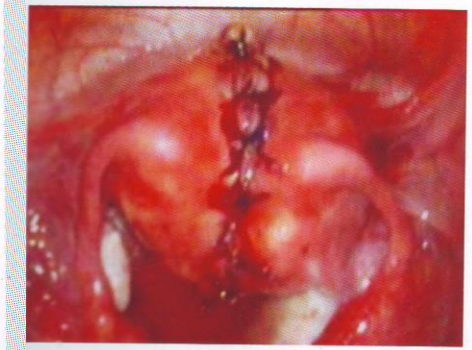
MRI



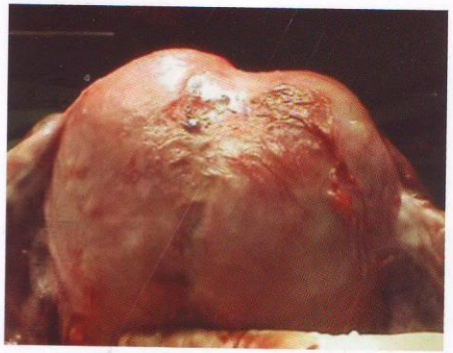
SURGICAL MANAGEMENT

- Metroplasty is reserved only in recurrent aborters
- Strassmann procedure either by Laparoscopy or Laparotomy





Laparoscopic unification of Bicornuate uterus



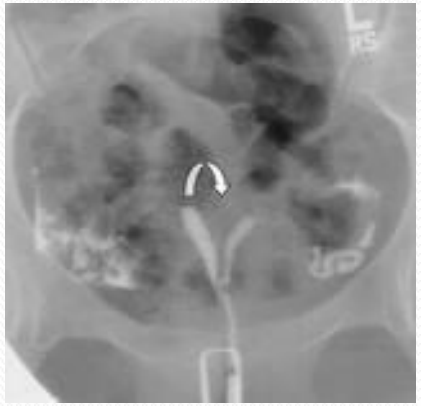
Unified uterus at LSCS

Septate Uterus (Class V)

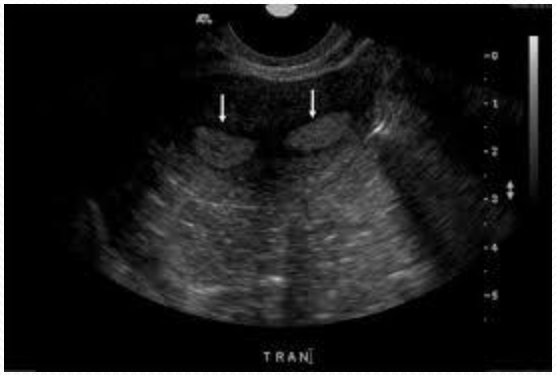
- resorption defect: complete or partial rarely a complete vaginocervicouterine septum is found.
- infertility or RPL.
- adverse pregnancy outcomes: miscarriage, preterm delivery, and malpresentation
- Hysteroscopic septal resection: improve pregnancy rates and outcomes (63% Pregnancy rate and 50% live birth rate following resection).

IMAGING MODALITIES IN SEPTATE UTERUS

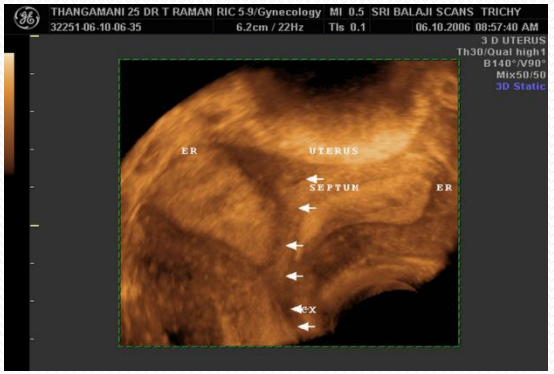
HSG

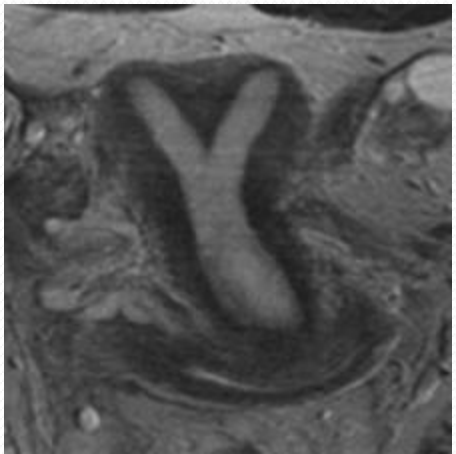


USG



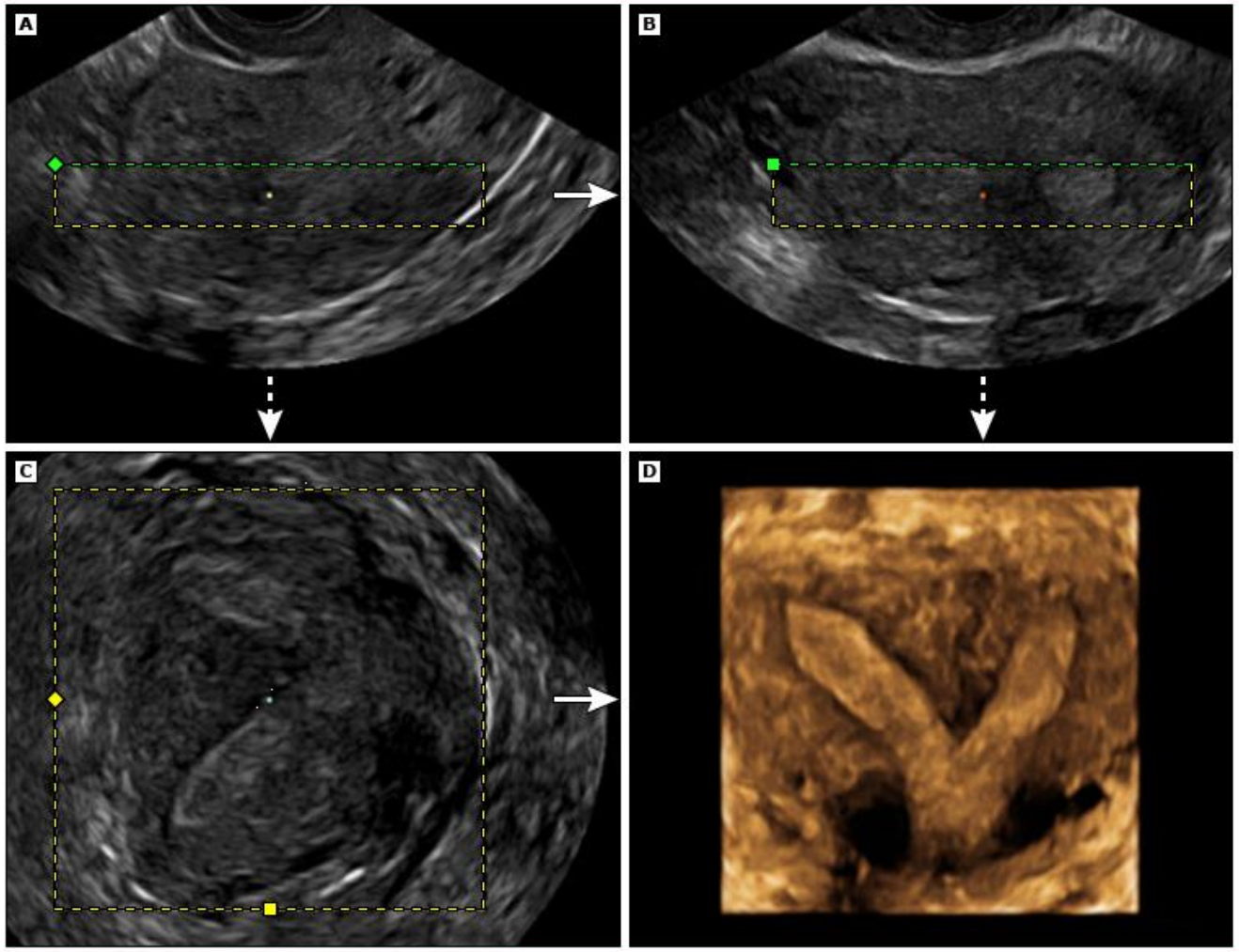
3DUSG





MRI

Transvaginal ultrasound images of septate uterus



(A) Original image from volume obtained in the sagittal plane.
(B) Reconstructed image in the transverse plane shows two endometrial cavities.
(C) Reconstructed image in the coronal plane shows the deviation of the endometrial cavities.
(D) Three-dimensional reconstructed image shows a single lower endometrial cavity that splits into two cavities. The outer contour of the myometrium is smooth.

Courtesy of Deborah Levine, MD.

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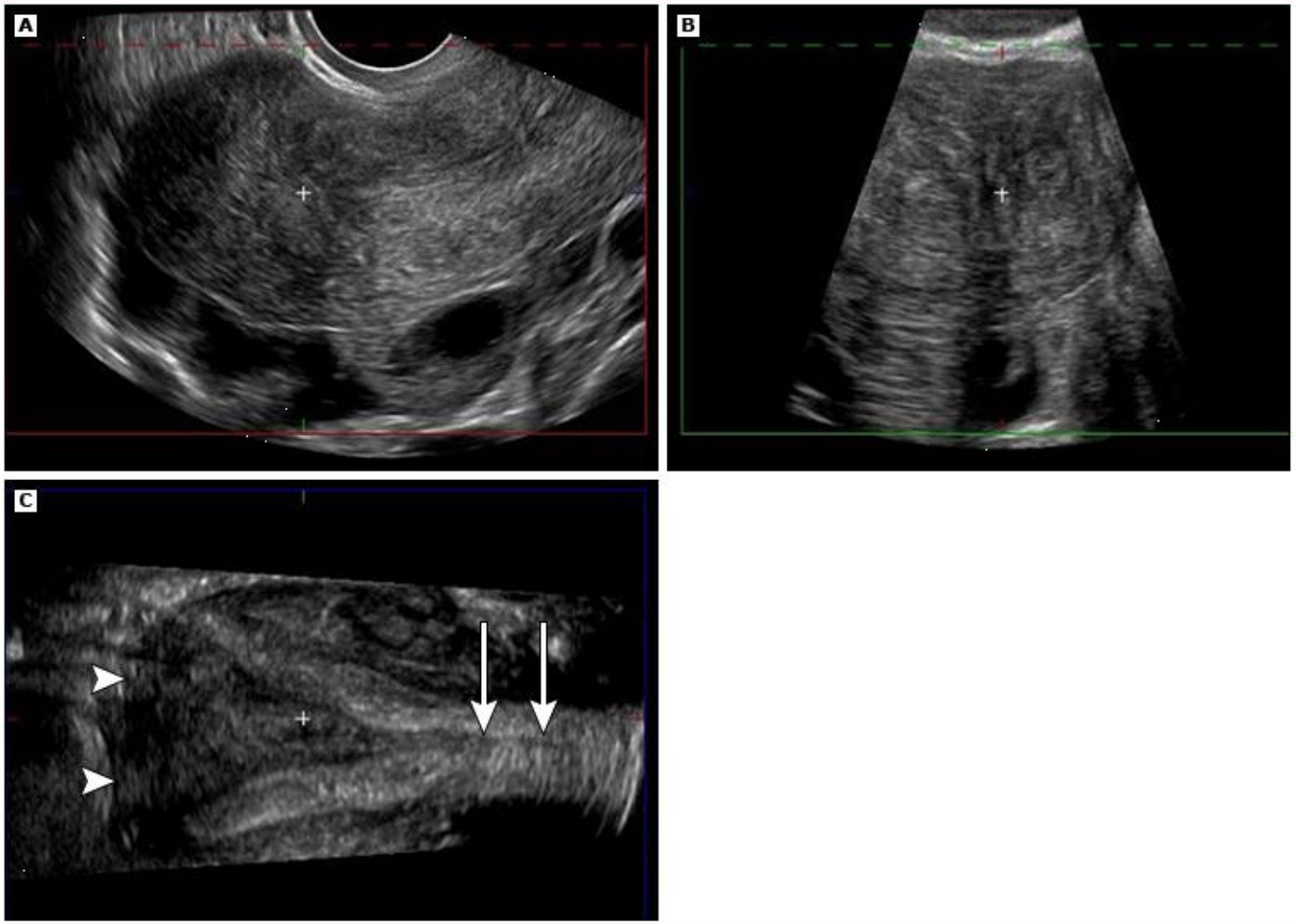
Septate uterus with septum extending into cervix



Three-dimensional ultrasound shows midline sagittal image (A) and transverse image (B). The reconstructed image in the coronal plane (C) shows a septum extending into the cervix (arrows). Note the smooth external contour of the myometrium (arrowheads).

Courtesy of Deborah Levine, MD.

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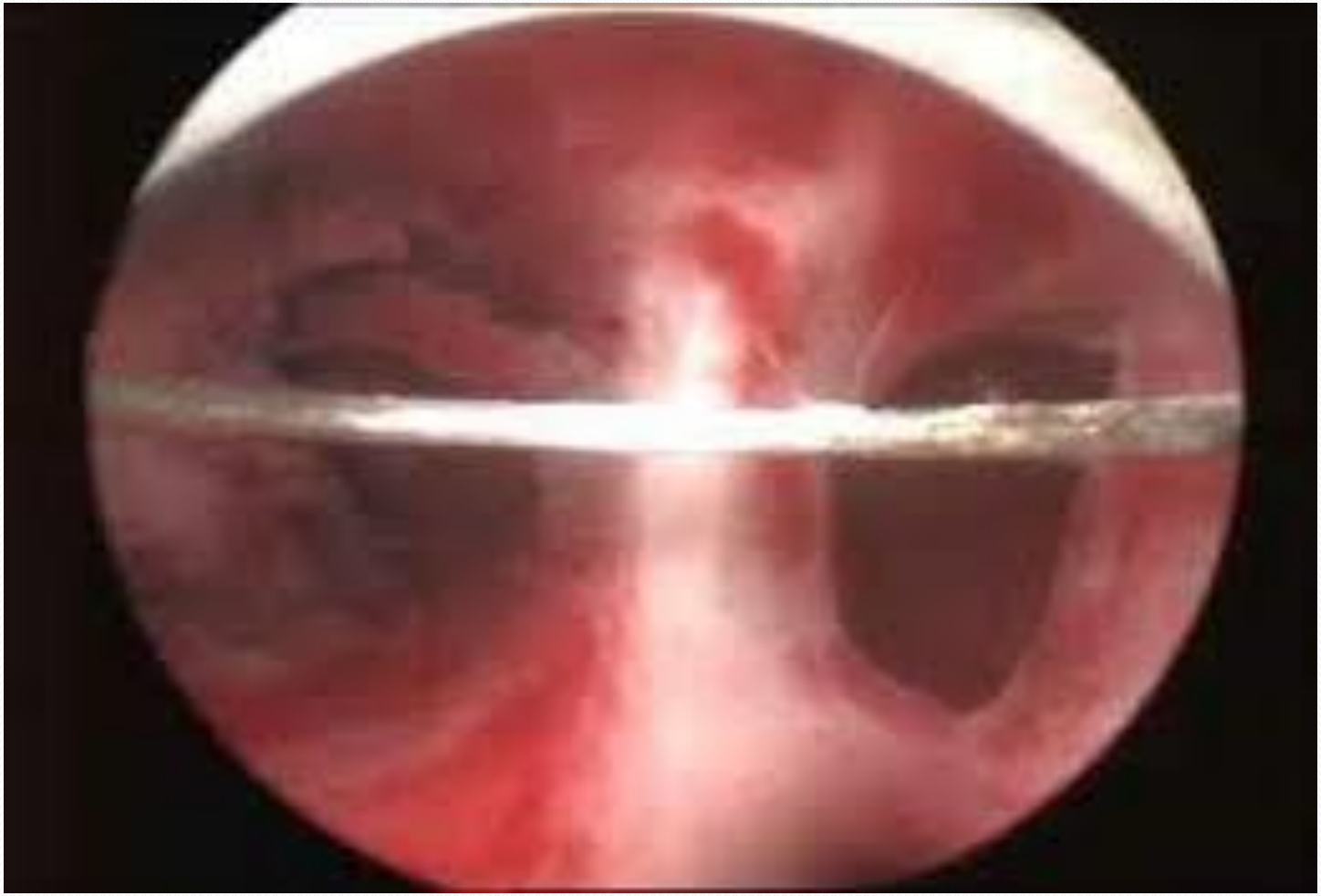
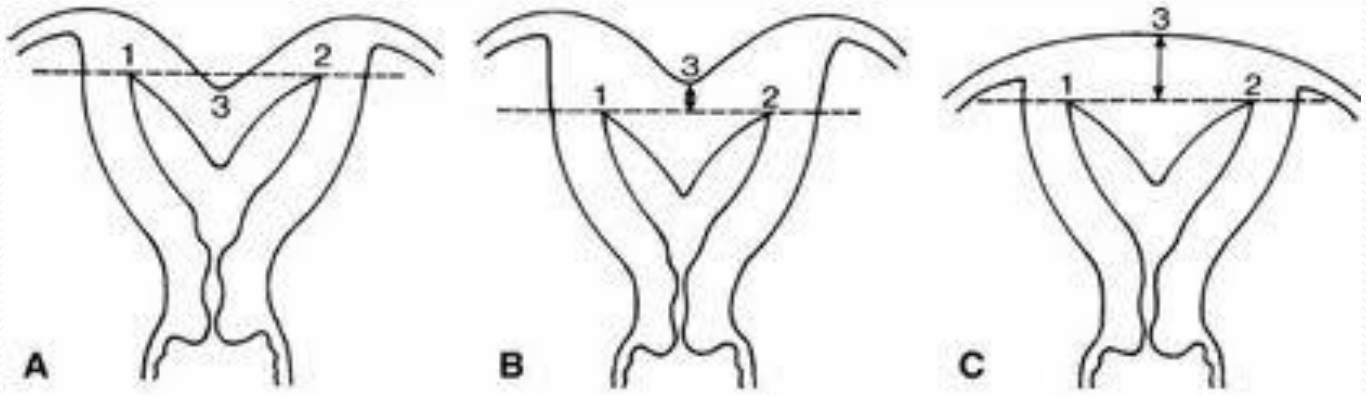


ULTRASOUND IMAGING OF SEPTATE AND BICORNUATE UTERUS

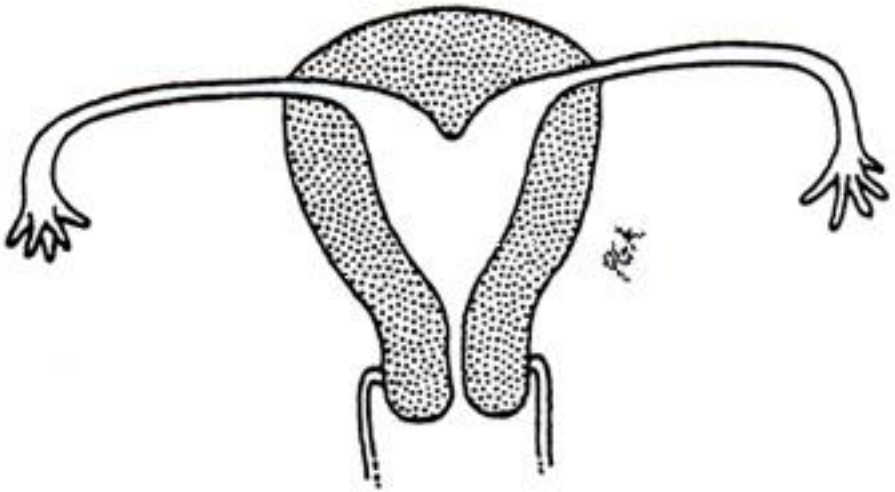


Anna Lev-Toaff, MD , Thomas Jefferson University, PA

Arcuate Uterus (Class VI)

- mild deviation from the normally developed uterus.

Arcuate uterus



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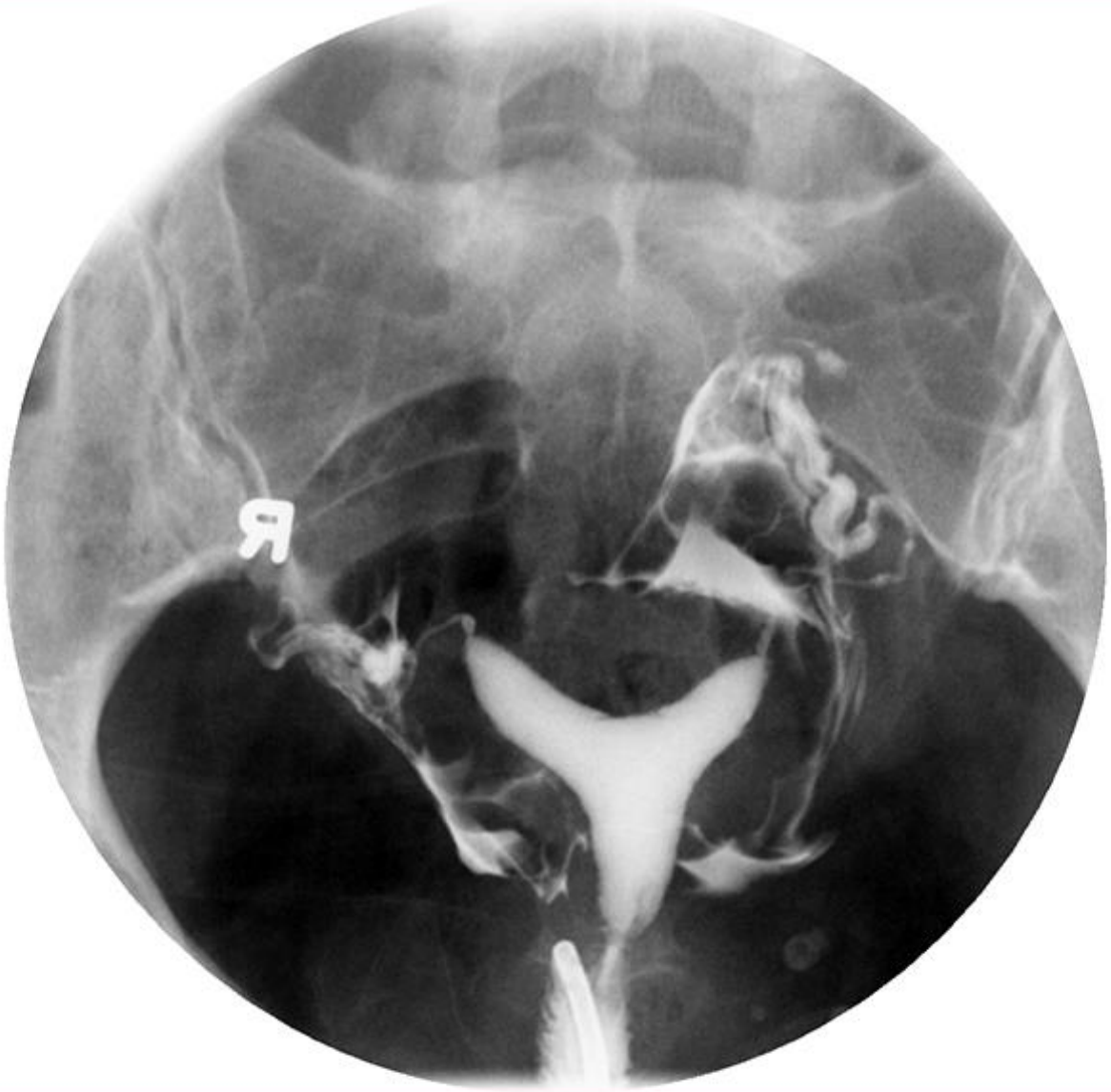
Hysterosalpingogram of arcuate uterus



Courtesy of Robert L Barbieri, MD.

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- **Clinical significance** — Although previously believed to have clinical significance, an arcuate uterus is now considered to be a normal variant. Patients are asymptomatic, have no compromise of fertility, and similar pregnancy outcomes as those in the general obstetric population.

Treatment with Cerclage

- Some women with uterine anomalies and repetitive pregnancy losses may benefit from transvaginal or transabdominal cervical cerclage
- Others with partial cervical atresia or hypoplasia may also benefit.

Diethylstilbestrol Reproductive Tract Abnormalities (Class VII)

- During the 1960s, a synthetic nonsteroidal estrogen—diethylstilbestrol (DES)—was used to treat pregnant women for threatened abortion, PTB, preeclampsia, and diabetes.
- The treatment was remarkably ineffective.
- reproductive-tract abnormalities: transverse septa, circumferential ridges, and cervical collars. Uteri potentially had smaller cavities, shortened upper uterine segments, or T-shaped and other irregular cavities.
- vaginal clear cell adenocarcinoma
- CIN
- small-cell cervical carcinoma
- vaginal adenosis
- Infertility, miscarriage, ectopic pregnancy, PTB
- Now, more than 50 years after DES use was proscribed, most affected women are past childbearing age, but higher rates of earlier menopause, cervical intraepithelial neoplasia, and breast cancer are reported in exposed women.


Thanks for Your Attention..