Mullerian Anomalies

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Objectives

• Review Embryology of genital tract development
• Examine/classify anomalies
• Treatments
• Outcomes
## Comparison table: aneuploidy and euploidy of the gonosomes

<table>
<thead>
<tr>
<th>Karyotype</th>
<th>Phenotype</th>
<th>Gonad</th>
<th>Syndromes</th>
<th>Fate</th>
</tr>
</thead>
<tbody>
<tr>
<td>45, XO</td>
<td>female</td>
<td>Ovaries</td>
<td>Turner's syndrome</td>
<td>Atrophy of the ovaries</td>
</tr>
<tr>
<td>45, YO</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Absence of the X-chromosome is lethal</td>
</tr>
<tr>
<td>46, XX</td>
<td>female</td>
<td>Ovaries</td>
<td>Normal woman</td>
<td>Normal development</td>
</tr>
<tr>
<td>47, XXX</td>
<td>female</td>
<td>Ovaries</td>
<td>Normal fertility</td>
<td>Normal development</td>
</tr>
<tr>
<td>46, XY</td>
<td>male</td>
<td>Testes</td>
<td>Normal man</td>
<td>Normal development</td>
</tr>
<tr>
<td>47, XXY</td>
<td>male</td>
<td>Testes</td>
<td>Kleinfelter's</td>
<td>Small testes, azospermia</td>
</tr>
<tr>
<td>47, XYY</td>
<td>male</td>
<td>Testes</td>
<td>Normal fertility</td>
<td>Normal development</td>
</tr>
</tbody>
</table>
**Embryology**

1. Upper part of gubernaculum
2. Mesonephros
3. Gonad
4. Urogenital cord
5. Dorsal mesentary
6. Paramesonephric duct (Mullerian)
7. Metanephros
8. Mesonephric duct (Wolffian)
9. Lower part of gubernaculum
10. Intestine

GREEN – Urogenital meso
PURPLE – Mesovarium
RED - Mesosalpinx
1. Upper part of gubernaculum
2. Mesonephros
3. Gonad
4. Urogenital cord
5. Dorsal mesentery
6. Paramesonephric duct
7. Metanephros
8. Mesonephric duct (W)
9. Lower gubernaculum
10. Intestine
1a. Paramesonephric duct (M)  
2a. Mesonephric duct (W)  
3a. Lower gubernaculum  
4a. Uterovaginal canal  
5a. Urogenital sinus

7th-8th week

1b. Fallopian tube  
2b. Atrophied Wolffian duct  
3b. Ovarian ligament  
4b. Uterus  
5b. Vagina

After 8 weeks

3rd month
1. Gubernaculum
2. Mesonephros
3. Paramesonephric duct (Mullerian)
4. Mesonephric duct (Wolffian)
5. Tubernaculum sinuale
6. Indifferent gonad
7. Lower gubernaculum
8. Urogenital sinus
9. Genital swelling

1. Epoophoron
2. Paraoophoron
3. Ovarian ligament
4. Mesonepric duct – atrophied
5. Gartner cyst
6. Hymen
7. Suspensory ligament of ovary
8. Uterine tube
9. Cyst of morgagni
10. Uterus
11. Round ligament
12. Vagina
13. Insertion of round in labia majora
1. Genital tubercle
2. Vestibule
2a. Urovaginal sinus – pelvic part
2b. Urovaginal sinus - phallic part
3. Vaginal plate
4. Perineum
5. Rectum
6. Uterovaginal canal
7. Urinary bladder
8. Urethra

7th week

12th week

Canalization of the vaginal plate

3rd month

5th month
2. Vaginal vestibule
3a. Uterine cavity
3b. Uterine cervix
6a. Vagina: lower 1/4th out of endoderm
6b. Vagina: the upper 3/4th out of mesoderm
9. Hymen
Types of Defects

• Agenesis

• Lateral fusion defects (including failure of resorption)

• Vertical fusion defects
  • Failure of fusion of the caudal end of Mullerian duct to SUG or
  • Failure of vaginal canalization
Mullerian Agenesis (MRKH)

An **absent or incomplete migration** of the paramesonephric duct in the direction of the SUG is responsible for an atresia and/or complete or incomplete aplasia of the uterus, which is usually associated with renal abnormalities. This syndrome is called the Mayer Rokitansky Kuster Hauser syndrome.
Lateral fusion defects

- Most common
- Symmetric/asymmetric
- Obstructed/non-obstructed
- Failure of
  - formation
  - migration
  - fusion
  - absorption
Unicornis Unicollis

More common in infertile women
Higher risk of ectopic pregnancy
Higher risk of second trimester loss
Higher risk of preterm birth
Increased risk of IUFD
Uterus didelphys bicollis
Uterus bicornis bicollis
Uterus bicornis unicollis
Uterus septus
Uterus septus subtotalis unicollis
Uterus septus unicornis bicollis
Pregnancy Risks associated with Mullerian Anomalies

- Yes, almost all adverse pregnancy risks have been shown in some studies to be associated with any of the anomalies
- First trimester loss - uterine septum (even this is somewhat controversial, and surgical correction has been shown in smaller studies to improve results)
- No place for surgery for fusion defects that are communicating
Surgical Challenges

- Non-communicating
  - uterine horns
  - hemi-vagina

- Almost all of these will have evidence of endometriosis (if communicating with pelvis) or hematometra/hematocolpos
Classification System
(one of several)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Subcategories</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Hypoplasia/agenesis</td>
<td>(a) Vaginal  (b) Cervical</td>
<td>(c) Fundal  (d) Tubal  (e) Combined</td>
</tr>
<tr>
<td>II Unicornuate</td>
<td>(a) Communicating  (b) Non Communicating</td>
<td>(c) No cavity  (d) No horn</td>
</tr>
<tr>
<td>III Didelphus</td>
<td></td>
<td>(a) Complete  (b) Partial</td>
</tr>
<tr>
<td>IV Bicornuate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V Septate</td>
<td>(a) Complete  (b) Partial</td>
<td></td>
</tr>
<tr>
<td>VI Arcuate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VII DES drug related</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Renal anomalies

- Commonly associated with Mullerian defects (20-30%)
- Renal agenesis most common with lateral Mullerian agenesis (unicornuate with absent or obstructed rudimentary horn)
- NO reported cases of bilateral obstruction of uterine horns (typically associated with bilateral renal agenesis - lethal)
- Need evaluation of renal status (sono, IVP)
Management of congenital uterine abnormalities
Gerard S. Letterie
Reproductive BioMedicine Online
Volume 23, Issue 1, Pages 40-52 (July 2011)
DOI: 10.1016/j.rbmo.2011.02.008
UNICORNUATE UTERUS

Evaluate for rudimentary horn
Evaluate for Renal Agenesis
No surgical options
Monitor for preterm labor/PPROM
Monitor cervical length
? Cerclage if previous preterm birth
Progesterone?
Septate Uterus

Classification always a problem

This one is easy!

We would repair this prior to ART

Probably repair if identified in an infertility workup

Certainly repair if history of first trimester losses

Scissors, cautery

Re-evaluate after surgery (HSG, 3-D SHG)
Summary - Mullerian Anomalies

• Incidence - 2-4% of fertile women (including infertile women without RPL)
• With history of RPL, incidence is 5-25%
• Signs and symptoms: dysmenorrhea, menstrual abnormalities, hematocolpos, RPL, preterm birth, malpresentation, preterm birth
• HSG, 3-D sono, MRI, scope/scope for diagnosis
• Screen for renal anomalies (especially with unicornuate uterus)
• Surgery - septum resection for RPL; removal of obstructed/functional hemi-uterus (+tube)