Mullerian agenesis with descent of ovary

A case report

Dr Saswati
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A patient X, 20 yrs female presented with c/o primary amenorrhoea

H/O:
- Not attained menarche till date
- No history of cyclical pain abdomen
• **Past history:**
  – Diagnosed to have B/L inguinal hernia & operated at age of 9 yrs

– **Reports :**
  • Left side hernia – calcified ovary with fallopian tube, hence both were removed
  • Right side hernia – (Ovary & tube) – normal, preserved
  • B/L herniotomy done
No h/o DM, TB, bronchial asthma etc.

Family history:
- No similar history of delayed menarche
- A younger sister (17yrs) has attained menarche
• **On Examination**
  
  – General condition : fair
    ✓ ht- 150 cm
    ✓ wt- 55 kg
    ✓ Built – average
    ✓ No Hirsuitism
    ✓ B/L breast – well developed (Tanner stage- V)
    ✓ Axillary , Pubic hair – present
    ✓ Hair distribution pattern - normal
P/A examination

- Soft
- B/L inguinal scar marks present

Local examination

- External genitalis - well developed
- No clitoromegaly
- Vagina – absent

P/R examination

- Uterus not felt
Investigations:

- **USG** –
  - Small uterus (2.7 X 1.1 cm)
  - Endometrial strip – not made out
  - Right ovary (4.5 X 2.5 cm) with follicles
  - Left ovary – not visualised

18/07/2011
UTERUS

RT OVARY WITH FOLLICLES
Investigations:

Karyotyping – 46XX, normal study (20/07/11)
Intra-operative findings:

- Left tube & ovary absent
- Right lateral part of fallopian tube with ovary present along with a nodule, ? (rudimentary right horn of uterus) attached to the lateral pelvic wall
- POD – free
- Right ovarian cyst (2X2 cm)
- Adhesions between omentum & ant abdominal wall in the left side
Diagnosis:

* Mullerian agenesis with descent of ovary

- Ovarian cystectomy with adhesiolysis done
- Post operative period uneventful
- HP report: Benign cyst of ovary
DISCUSSION
Embryologic processes in development of internal female genitalis
Genetic Sex:

Gonadal Sex:

Internal Genital Sex:

External Genital Sex:

Undifferentiated Phase

Differentiated Phase
Indifferent Embryo

- Components which form the adult female and male reproductive systems are:
  1. Gonads: ovaries or testes
  2. Genital Duct Systems
     (Paramesonephric and Mesonephric Ducts)
  3. External Genitalia
• Genotype of embryo 46XX or 46XY is established at fertilization

• Weeks 1-6 sexually indifferent or undifferentiated stage; that is genetically female and male embryos are phenotypically indistinguishable

• Week 7: phenotypic sexual differentiation begins

• Week 12: Female or male characteristics of external genitalia can be recognized

• Week 20: Phenotypic differentiation is complete.
Genital Duct Development

- 6th week: two pairs of genital ducts

- **Mesonephric Duct** extending from the mesonephros (Wolff’s body) to the cloaca (urogenital sinus) referred to as the **Wolffian system**

- Second duct arises as a longitudinal invagination of coelomic epithelium on the anterolateral surface of the urogenital ridge, known as **Paramesonephric or Mullerian Duct.**
• Cranial part (paramesonephric ducts) : uterine tubes

• Caudal portions fuse and form the uterovaginal primordium and bring together two peritoneal folds, the broad ligament.

• Initially they remain separated by a septum but later they fuse to form the uterus.
Embryology of Vagina

- Embryology controversial

- Derived paramesonephric ducts / mesonephric ducts /urogenital sinus, or a combination.

- Most accepted, superior part derived by fusion of paramesonephric, while inferior part arises from urogenital sinus.

- BUT it is assumed that the “inductor” function of the mesonephric ducts stimulate adequate mullerian / paramesonephric development
• Mullerian tubercle is the cellular condensation b/w inferior part of fused paramesonephric ducts and urogenital sinus.

• Sinovaginal bulbs develop, constitute vaginal plate.

• Cavity formed lined with paramesonephric epithelium, opens into the urogenital sinus and the metaplastic induction to polystratified plain epithelium produce the vagina.
Mesonephric duct induction

- Vagina derived from fused mesonephric ducts and Mullerian tubercle.
- Paramesonephric ducts form uterus to external cervical os and adequate formation is induced by mesonephric ducts.
- Mesonephric ducts regress cranially but at cervical os, they enlarge and form the sinovaginal bulbs.
- The paramesonephric cellular condensation (mullerian tubercle) incorporates itself in the vaginal plate formed by fusion of the two bulbs.
- Cavitation allows the paramesonephric cells to line the primitive vaginal cavity with paramesonephric epithelium.
Mullerian duct anomalies
Etiology

- Unknown

- Activating mutation of either the gene for AMH or the gene for the AMH receptor

- Genetic female fetus exposed to AMH \textit{in utero} during embryogenesis might develop mullerian duct regression
### Classification System: American Fertility Society, 1988

#### Classification of Müllerian Anomalies
According to the AFS Classification System

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: <strong>&quot;Müllerian&quot; agenesis or hypoplasia</strong></td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>Vaginal (uterus may be normal or exhibit a variety of malformations)</td>
</tr>
<tr>
<td>B.</td>
<td>Cervical</td>
</tr>
<tr>
<td>C.</td>
<td>Fundal</td>
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<tr>
<td>D.</td>
<td>Tubal</td>
</tr>
<tr>
<td>E.</td>
<td>Combined</td>
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<tr>
<td>II: <strong>Uniconuate uterus</strong></td>
<td></td>
</tr>
<tr>
<td>A1a.</td>
<td>Communicating (endometrial cavity present)</td>
</tr>
<tr>
<td>A1b.</td>
<td>Noncommunicating (endometrial cavity present)</td>
</tr>
<tr>
<td>A2.</td>
<td>Horn without endometrial cavity</td>
</tr>
<tr>
<td>B.</td>
<td>No rudimentary horn</td>
</tr>
<tr>
<td>III: <strong>Uterus didelphys</strong></td>
<td></td>
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<tr>
<td>IV: <strong>Uterus bicornuate</strong></td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>Complete (division down to internal os)</td>
</tr>
<tr>
<td>B.</td>
<td>Partial</td>
</tr>
<tr>
<td>C.</td>
<td>Arcuate</td>
</tr>
<tr>
<td>V: <strong>Septate uterus</strong></td>
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<tr>
<td>A.</td>
<td>Complete (septum to internal os)</td>
</tr>
<tr>
<td>B.</td>
<td>Partial</td>
</tr>
<tr>
<td>VI: <strong>Diethylstilbestrol–related anomalies</strong></td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>T-shaped uterus</td>
</tr>
<tr>
<td>B.</td>
<td>T-shaped with dilated horns</td>
</tr>
</tbody>
</table>
Mayer-Rokitansky-Kuster-Hauser Syndrome (Utero-vaginal agenesis)

- 15% of primary amenorrhea
- Normal secondary sexual development & external female genitalia
- Normal female range testosterone level
- Absent uterus and upper vagina & normal ovaries
- Karyotype 46-XX
- 15-30% renal, skeletal and middle ear anomalies
- Diagnosis by radiologically / laparoscopically
- Treatment of choice: surgical/nonsurgical – aimed at creating neovagina
Descent of Gonads

- Migration of gonads to its final location requires a cascade of complex molecular and morphological events occurring at appropriate times and in correct sequence.

- Ovary in a hernial sac may be a descended gonad mimicking normal descent of testis.
Descent of testes

- Controlled by different anatomic and hormonal mechanism

- Migration results by enlargement of gubernaculum in response to mullerian inhibiting substance (MIS) and testosterone

- Cryptochidism and persistence of the cranial gonadal ligament are seen in rat fetuses exposed to anti androgen

* H Ozbey, M. Ratschek, G. Schimpi, M. E. Hollwarth
Descent of Ovary

- Ovaries ascend under the influence of developing cranial ovarian suspensory ligament

- Partial descent of the fetal ovaries is observed in androgen treated mice

- As primodial structures in the internal genitalia suspensory structures show sexual dimorphism and the gonadal migration is a steroid hormone mediated process, the cessation of migration might be related to the regulation at the tissue receptor level
The patency of the processus vaginalis (responsible for undescended testis) and enigmatic features of the suspensory structures of the internal genitalia determine the final gonadal position

The ligament which lies in the inguinal hernia sac of girls was thought to be round ligament, but now hypothesized to be the suspensory ligament of the ovary

* H Ozbey, M. Ratschek, G. Schimpi, M. E. Hollwarth
In 1986, Bradshaw KD et al (Obstet Gynecol. 1986;68(3):50s-52s) reported a case of inguinal hernia containing ovary and fallopian tube in a woman of reproductive age.

Amarin ZO et al (Int J Gynaecol Obstet, 1988, Aug:27(1)141-3) had reported a case of indirect inguinal hernia with an ovary and fallopian tube.

An increased incidence of mullerian agenesis with prolapsed ovaries is seen in prematurely born infants. A prolapsed irreducible ovary should be treated as surgical emergency as it is at significant risk of torsion which may lead to infarction and operative repositioning of ovary is recommended (Marinkovic S et al Med Pregl 1998;51(11-12):537-40)
In 2000, a case of mullerian agenesis with symptomatic inguinal hernias containing ovaries was reported and Laparoscopic approach to inguinal hernias was suggested as an option (Vaughn TC et al, Fertil Steril, 2000 June, 73(6)1238-40)

Kives SL et al (J. pediatr.surg.2005.Aug;40(8)1326-28) had reported a rare case of mullerian agenesis with ovarian torsion and concluded that the lax attachment of the adnexa may be a contributing factor for torsion
The association of mullerian agenesis and B/L inguinal ovaries is rare and surgical reduction of gonads is necessary (Bazi T et al, Fertil Steril 2006;85(5):1510.E5.8)

In 2011, a case of inguinal uterus, fallopian tube and ovary associated with MRKMH syndrome was reported (Al Omari W et al, Fertil Steril 2011, March1;95(3):1119-e1-4)
Conclusion

- Inguinal hernia containing an ovarian and fallopian tube is an extremely rare occurrence and are commonly associated with defect in genital tract development.

- Ovarian hernia: theorized to represent a descended gonad under hormonal influence rather than a simple prolapse.

- Surgical repositioning of ovaries is necessary.

- Patient should be counselled for construction of neovagina.
References

- M. Folch, I. Pigem & J. C. Konje: Mullerian agenesis, etiology, diagnosis and management; Obst and Gynaec survey, vol 55
- H. Ozbey, M. Ratschek, G. Schimpi, M. E. Hollwarth: Ovary in hernial sac; J. Pediatr Surg 34; 977-980
- Bazi T, Berzawi G, Seoud M: Inguinal ovaries associated with mullerian agenesis; Fertil Steril, 2006 May; 85(5): 1510.e5-8
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Acknowledgement
THANK YOU