W23: Transitioning Care; The Evolving care of women with congenital genitourinary anomalies

Workshop Chair: Margaret Mueller, United States
29 August 2018 16:00 - 17:30

Start	End	Topic	Speakers
16:00	16:15	Introduction to Transitioning care for women with Congenital GU anomalies	Margaret Mueller MD
16:15	16:30	Surgical management of complex GU anomalies	Margaret Mueller
16:30	16:50	Sexual health concerns with GU anomalies	Maureen Sheetz APN, WHNP-BC
16:50	17:10	Fertility and Reproductive Potential with GU anomalies	Lia Bernardi MD
17:10	17:30	Pelvic Floor Disorders in women with GU anomalies	Kimberly Kenton MD, MS

Aims of Workshop

1. Describe common congenital genitourinary (GU) anomalies and their effects in women during different stages of life (adolescence, reproductive years, perimenopause/menopausal years).

2. Describe the medical and surgical management of GU anomalies and the associated sequelae of these interventions.

3. Uncover the gaps in care for women with GU anomalies, and strategies to maintain adequate care in this population.

Learning Objectives

1. Define the need and objectives of a “transitions clinic” for women with congenital GU anomalies and Identify types of GU anomalies, with which women are diagnosed, which might benefit from a transitions clinic.
2. Illustrate the fertility, pelvic floor and sexual health concerns and needs of women with congenital genitourinary anomalies.
3. Demonstrate integrated and comprehensive management for women with congenital genitourinary anomalies.

Learning Outcomes

After attending this course the participant will be able to identify the sequelae of common genitourinary anomalies as well as strategies for managing these chronic conditions.

Target Audience

Urogynaecologists; urologists; female pelvic medicine and reconstructive surgery specialists; trainees (residents/fellows).

Advanced/Basic

Advanced

Conditions for Learning

Learners will be exposed to different speakers who will convey their information through powerpoint presentations.

Suggested Learning before Workshop Attendance

R.M. Laterza et al. / European Journal of Obstetrics & Gynecology and Reproductive Biology 159 (2011) 26–34
MA Hall-Craggs et al./Journal of Pediatric Urology (3013) 9, 27-32
PK Heinonen / European Journal of Obstetrics & Gynecology and Reproductive Biology 206 (2016) 141-46

Suggested Reading

R Chan, UROLOGY 84: 1544e1548, 2014
H Stephany, UROLOGY 85:959e963, 2015
K.A.McCracken,M.E.Fallat, Seminars in Pediatric Surgery 24(2015)88–92
S.M. Lambert / Seminars in Pediatric Surgery 24 (2015) 73–78
Khavari R, Journal of Urology 194 (2015) 1654-8 PMID 26210885
V Trofimenko, Current Opinion Urology 26 (2016) 357-62

Margaret Mueller, MD

This workshop will focus on the evolving care of women with congenital GU anomalies. First, we will highlight the idea of "transitioning care" for these women. Specifically, the transition requires a seamless and integrated "hand-off" between pediatric providers and specialized adult providers well versed in anticipating future needs of these adolescents and young women with respect to the known sequelae- pelvic floor disorders, sexual dysfunction and fertility challenges. Urogynecologists

are well-suited to orchestrate this transition as surgeons and pelvic health specialists. Additionally, sexual health providers, reproductive endocrinologists, physical therapists are crucial to the interdisciplinary management of these young women.

Briefly, we will illustrate both common and uncommon GU anomalies and their associated specific sequelae as well as their initial surgical management. Attention will be paid to the pelvic reconstructive techniques including vaginoplasty.

Sexual health concerns with GU anomalies
Maureen Sheetz APN

Sexual health is of utmost concern to practitioners caring for adolescents and young women with GU anomalies. Often times this is overlooked, and these women are not afforded the screening for and prevention of sexual health disorders. Moreover, women whom have undergone reconstructive procedures as children, face unique challenges with respect to sexual function as adolescents and adults. The timing and approach to reconstructive vaginal surgery (vaginoplasty) is extremely important and an issue of evolving complexity. Finally, issues related to decreased sexual satisfaction relating to pain, embarrassment and fear are present in this population. We will focus on the appropriate evaluation and management of sexual dysfunction in women with GU anomalies.

Fertility and Reproductive Potential with GU anomalies
Lia Bernardi MD

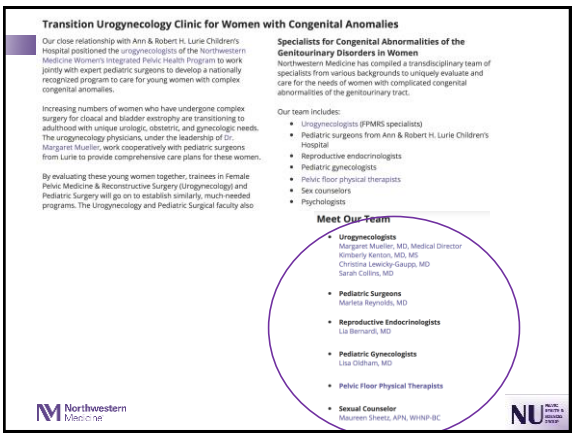
Gentiourinary anomalies can impact the ability of a woman to conceive as well as her capacity to carry a pregnancy to term. In this workshop we will review how genitourinary anomalies can affect fertility and will discuss treatment options aimed at optimizing pregnancy outcomes. Specifically, we will examine the most common uterine malformations including septate, bicornuate, unicornuate and didelphys uterus, discuss their impact on fertility and pregnancy outcomes and explain surgical treatments that may increase likelihood of reproductive success. We will describe how congenital adrenal hyperplasia can make achieving a pregnancy more challenging and will discuss options that can optimize an individual's ability to successfully conceive. In addition, we will discuss Mayer-Rokitansky-Kuster-Hauser syndrome and explain options for family building in the setting of müllerian agenesis. We will also review the latest outcome data on uterine transplant in this patient population.

Pelvic Floor Disorders in women with GU anomalies
Kimberly Kenton MD, MS

Pelvic floor disorders including prolapse and incontinence are very common in this population. Given the presence of anomalies and the associated surgical corrections, managing PFDs in this population is complex and can be challenging. We will focus on the evaluation and management of prolapse and incontinence in women with different GU anomalies. Specifically, we will examine the challenges of surgical management of prolapse and incontinence within this population, and the anticipated outcomes.

Transitioning care

- 22 year old presents to establish care
  - PMH
    - Bladder exstrophy
    - GU reconstruction as infant
    - Multiple surgical reconstructions
- What do you do????
  - Fertility/pregnancy
  - Sexual function
  - Urogynecologic concerns



Learning objectives

At the conclusion of this presentation the learner will be able to …

- Define the need and objectives of a "**transitions clinic**" for women with congenital GU anomalies and Identify types of GU anomalies with which women are diagnosed which might benefit from a transitions clinic
- Illustrate the **fertility, pelvic floor and sexual health** concerns and needs of women with congenital genitourinary anomalies
- Demonstrate **integrated and comprehensive** management for women with congenital genitourinary anomalies

Embryology of genitourinary system

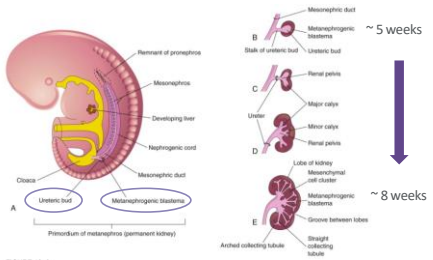
organs involved in reproduction and forming and voiding urine

- Embryology of renal system
  - kidney
  - ureter
  - bladder
  - urethra
- Embryology of uterus and vagina
- Embryology of external genitalia

All derived from **intermediate mesenchyme** (mesoderm) derived from the dorsal body wall of the embryo

Embryology

Development of the kidney



~ 5 weeks

~ 8 weeks

Embryology

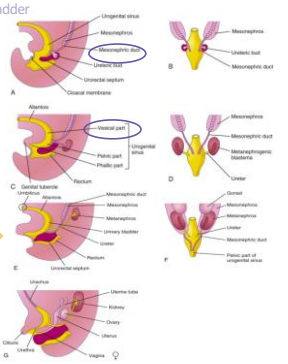
Development of urinary bladder

~5 weeks

Bladder develops from vesical part of UG sinus

Allantois and bladder are continuous

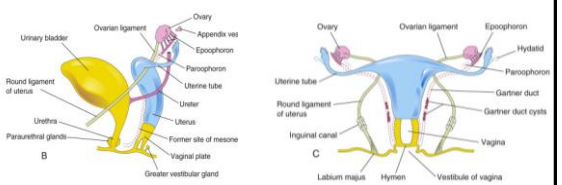
~12 wks



Ebryology

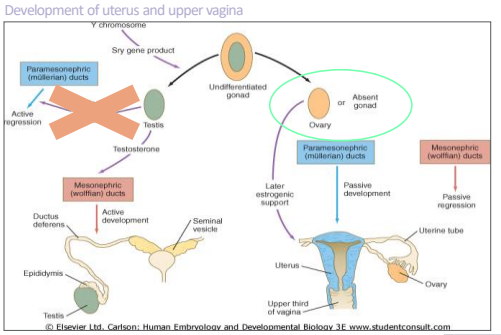
Development of genital system

Yellow- urogenital sinus
Pink- mesonephric duct
Blue- paramesonephric duct



Embryology

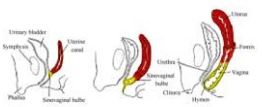
Development of uterus and upper vagina



© Elsevier Ltd. Carlson: Human Embryology and Developmental Biology 3E www.studentconsult.com

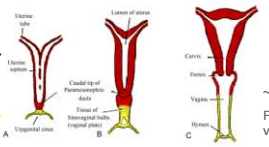
Embryology

Development of internal genitalia



Paramesonephric ducts

Urogenital sinus



~ 5 months, Fully cannulated vagina

Solid tip of PM ducts come into contact with UG Sinus

Sinovaginal bulbs grow from sinus and produce a vaginal plate

Proliferation increased the space between uterus and UG sinus

GU anomalies

- Anomalies requiring reconstruction of the genital system
  - Vaginal agenesis
  - Vaginal septa
- Anomalies requiring reconstruction of the urinary and genital system
  - Congenital adrenal hyperplasia
  - Bladder Exstrophy
  - Cloacal Exstrophy

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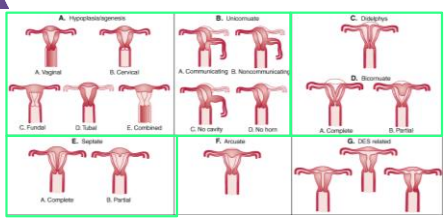
Anomalies affecting the genital system

Müllerian Anomalies



- Abnormal fusion/migration of Müllerian ducts
  - Absence/atresia of ducts (vaginal atresia, absence of uterus)
  - Aberrations in fusion (septate or didelphys)
  - Arrest of migration of the Müllerian ducts (persistent urogenital sinus)
- Prevalence 2-3%
- Commonly associated with renal anomalies

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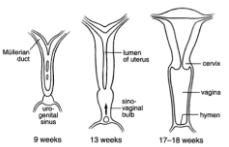
Vaginal septums

Failed müllerian duct fusion



- Failure of vertical vaginal fusion
- Failure of fused müllerian ducts to unite with UG sinus at müllerian tubercle
- Failure of fusion of endodermal vaginal primordium with mesodermal müllerian ducts

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Non-obstructive anomalies

- Vaginal
  - Longitudinal vaginal septae
  - MRKH
- Uterine
  - Arcuate
  - Bicornuate
  - Septate

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Obstructive Müllerian Anomalies

- Vaginal
  - Hymen→ pose problems as neonate (maternal estrogen stimulation) or at menarche
  - Transverse vaginal septum
    - Typically present as cyclical pain or primary amenorrhea
    - Low, mid-position or high
    - OHVIRA (obstructed hemivagina ipsilateral renal agenesis) can delay diagnosis
- Uterine
  - Non-communicating horns

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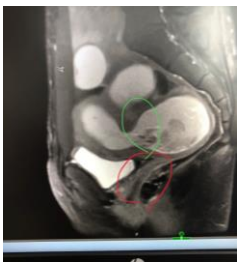
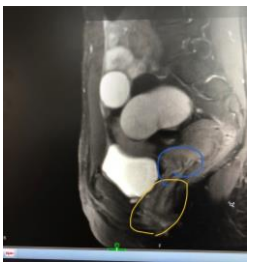
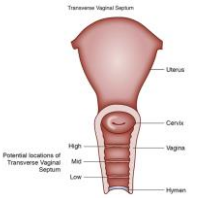
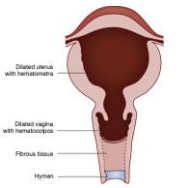
MRI- Very helpful

Management of Müllerian anomalies

- Non-obstructive
  - Indicated for sexual function or fertility
- Obstructive
  - Typically time sensitive
  - Can suppress cycle to provide more time

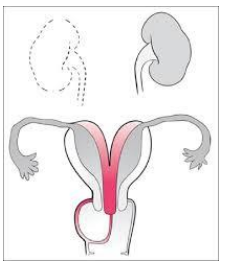




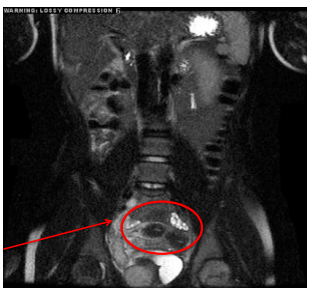
Herlyn Werner Wunderlich Syndrome

OHVIRA

- Uterine didelphys
- Obstructed hemivagina
- Ipsilateral renal agenesis

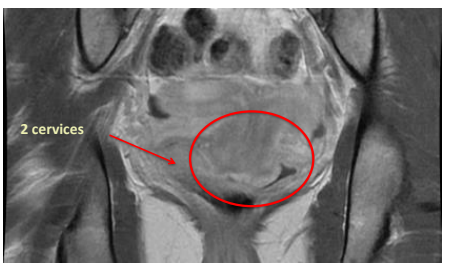


MRI coronal

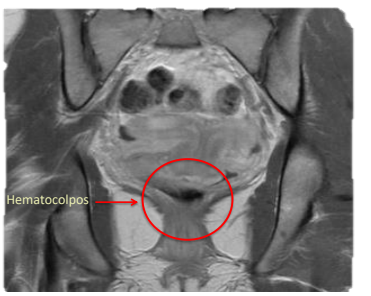


2 uterine cavities

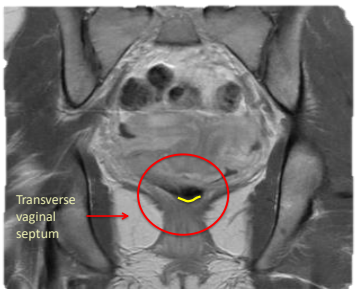
MRI coronal



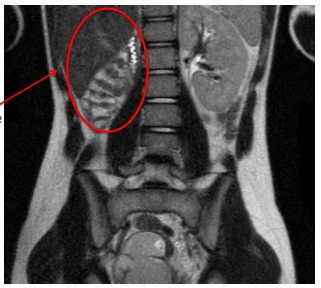
MRI coronal



MRI coronal



MRI coronal



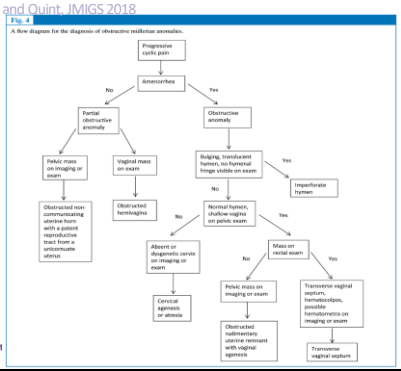
Diagnostic algorithm- obstructive mullerian anomalies

Skinner and Quint, JMIGS 2018

History

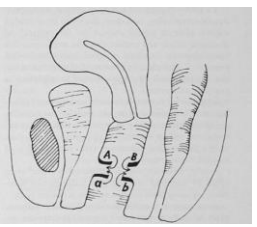
Physical

Imaging



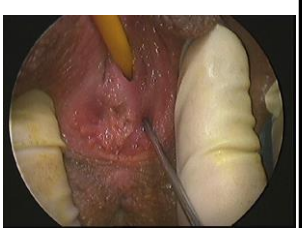
Excision of vaginal septums

- 2-3 mm thick – entire length of the vagina
- TV septum vs imperforate hymen vs vaginal atresia
  - MRI



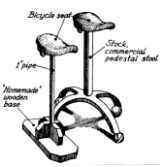
Mayer Rokitansky Küster Hauser Syndrome

- Spectrum of Müllerian anomalies in 46XX females
  - Vaginal agenesis
  - Uterovaginal agenesis
- Cessation of müllerian duct development caudal to genitoinguinal inguinal ligaments (round)
- Urinary and skeletal system defects



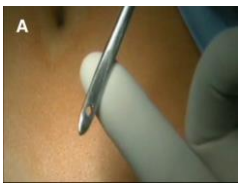
Creation of Neovagina

- Non Surgical
  - Simple Pressure (Frank)
  - Pressure from bicycle seat (Ingram)
  - Regular intercourse



- Surgical
  - Surgical creation of neovaginal space between rectum and bladder
    - Split thickness graft (Abbe, McIndoe)
    - Allogenic tissue (Amnion)
    - Peritoneum (Davydov)
    - Artificial grafts
    - Autologous graft (buccal mucosa)
  - Bowel vaginoplasty
  - Surgical traction (Vecchietti)

Creating a neovagina
Vecchietti



- Hailed as first line therapy
- Dilates vagina by passive traction on ovoid bead or olive attached by bilateral traction sutures to abdominal wall

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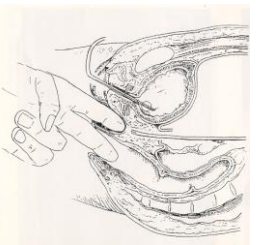
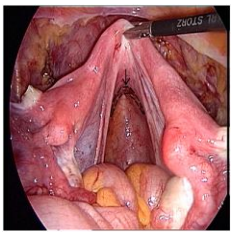
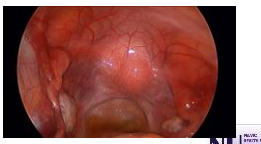
Vecchietti







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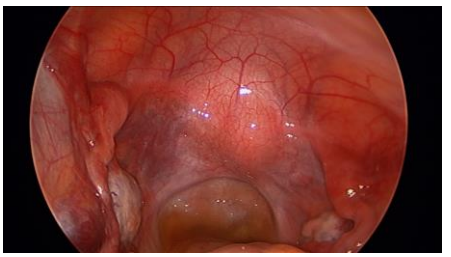
Absence of uterus/vagina



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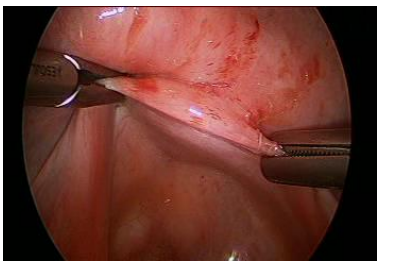
Finding vesico-rectal window



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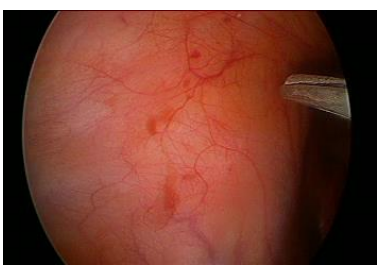

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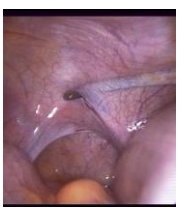
Laparoscopic Vecchietti



Video 2

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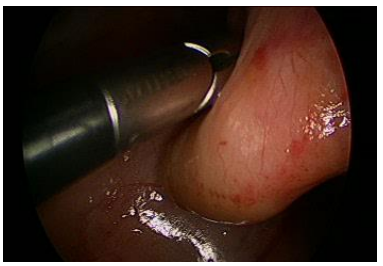
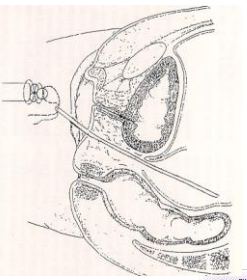
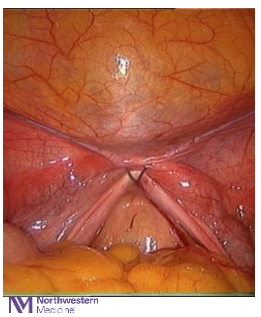
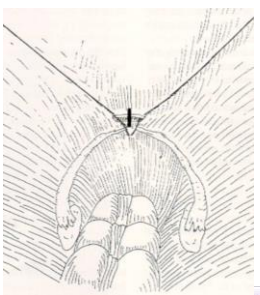


Laparoscopic Vecchietti



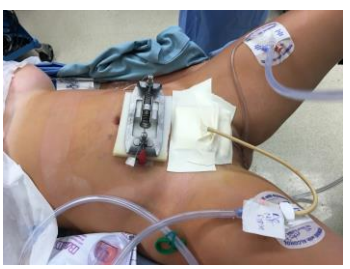
Laparoscopic Vecchietti





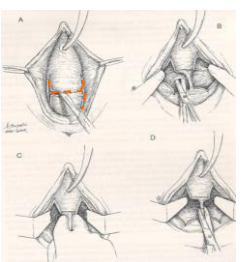
Mullerian Anomalies

Sexual Health

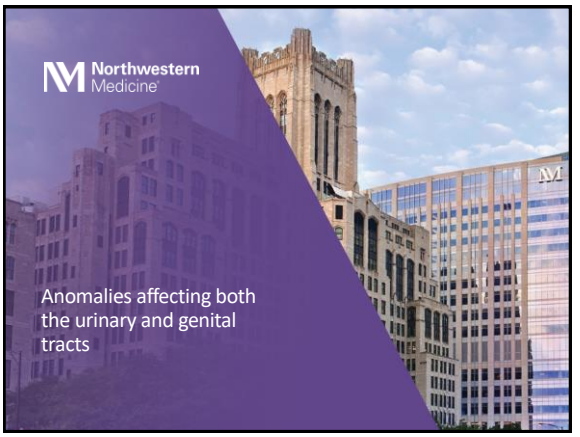


Creating a neovagina

Abbe McIndoe



- Graft to make lining of neo vagina
  - Split thickness skin from buttocks or groin
  - Interceed, repliform, OASIS (SIS)
  - Amnion
- Soft dilator wrapped in graft and left in vagina
- Post-op dilation for 3-6 months - forever



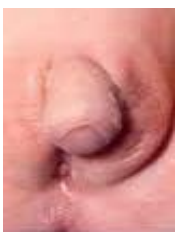
Congenital adrenal hyperplasia (CAH)

- Group of autosomal recessive disorders of cortisol biosynthesis
  - 21 hydroxylases deficiency (90% of cases)
- Overproduction of cortisol precursors → biosynthesis of sex hormones
- Classic 21 hydroxylase deficiency
  - 1/16,000 births
  - Simple virilizing and salt wasting phenotypes

CAH

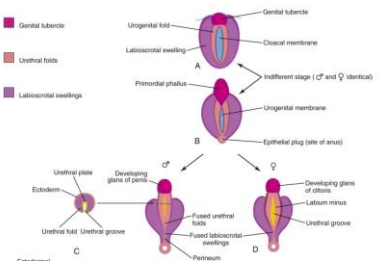
Clinical manifestations

- Phenotypic abnormalities in 46 XX
- Genital abnormalities
  - Enlarged clitoris
  - Partly fused labia majora
  - Common urogenital sinus
- Skeletal abnormalities
  - Short stature (premature epiphyseal closure or glucocorticoid inhibition of growth axis)



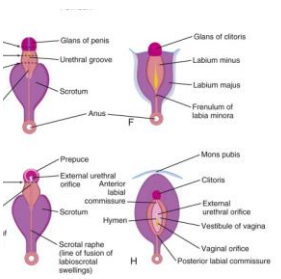
Embryology

Development of external genitalia



Embryology

Development of external genitalia



Congenital Adrenal Hyperplasia

Grades

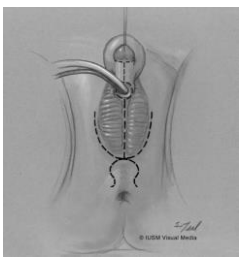
Female genitalia — Increasing virilization → Male genitalia

Prader classification.

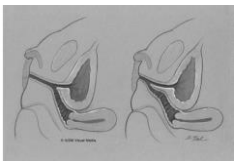
I. Hypertrophic clitoris with otherwise normal female genitalia
II. Hypertrophic clitoris, urogenital sinus, vaginal and urethral openings covered
III. Hypertrophic clitoris, narrow and deep urogenital sinus, high urethrovaginal confluence
IV. Phallus with small urogenital opening
V. Male genitalia

CAH
surgical approach

- Principles of surgical reconstruction
  - Clitoroplasty
  - Total urogenital sinus mobilization
  - Vaginal reconstruction
- Single operation versus staged procedure

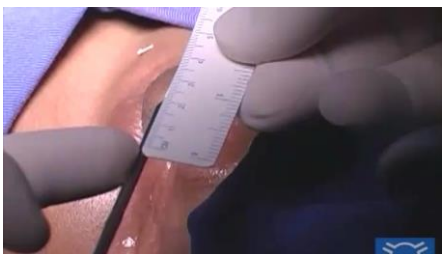


CAH
Total urogenital sinus mobilization (TUM)



- Entire UG sinus is dissected from perineum as a unit
- The "unit" will reach perineum, and a flap from the sinus can be attached to normal caliber vagina
- Urethra maintains orthotopic location
- Mobilized tissue can be used for vaginoplasty

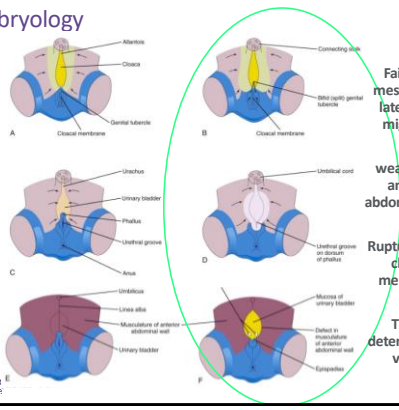
Video 4
CAH Surgical Steps



Exstrophy-Epispadias Complex

- Rare spectrum of multisystem birth defects involving the genitourinary system, gastrointestinal tract and musculoskeletal system
- Disorder of the development of the cloacal membrane
  - Classic Bladder Exstrophy (CBE)
  - Cloacal Exstrophy (CE)
- CBE results if the rupture occurs after the urorectal septum divides the gastrointestinal from the genitourinary tracts while CE results if the rupture occurs before this separation

Embryology



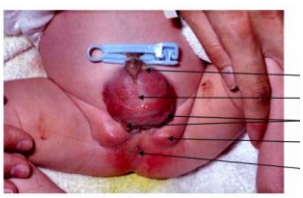
Failure of mesodermal lateral fold migration

weakness of anterior abdominal wall

Rupture of the cloacal membrane

Timing determines CE vs CBE

Classic Bladder Exstrophy
Anatomic manifestations



- Low set umbilicus
- Bladder
- Ureteral orrifices
- Separated pubis
- Anteriorly deviated anus

Classic Bladder Exstrophy

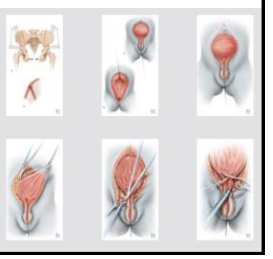
Initial surgical management

- Goals
  - Adequate low pressure urine storage
  - Urinary continence
  - Preserved renal function
  - Functional and cosmetically acceptable genitalia

Classic Bladder Exstrophy

Surgical repair

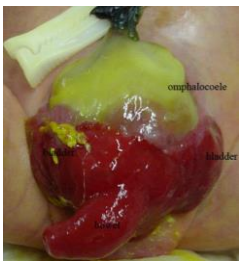
- Typical surgical repair
  - Closure of bladder and abdominal wall
  - Ureteral reimplantation
  - Bladder neck reconstruction
  - +/- pelvic osteotomies
- Secondary surgeries
  - Augmentation cystoplasty
  - Bladder neck closure with continent urinary diversion



Cloacal Exstrophy

OEIS Complex (omphalocele, exstrophy of bladder, imperforate anus, spinal abnormalities)

- 1/200,000 to 1/400,000 live births
- "Classic Exstrophy"
  - Omphalocele
  - Exstrophy of bladder (bivalved) and bowel
  - Imperforate anus and blind ending colon
  - Diastasis of symphysis
  - Duplicated uterus
  - Mons, clitoris, and labia are separated
  - Shortened and anteriorly displaced vagina



Cloacal Exstrophy

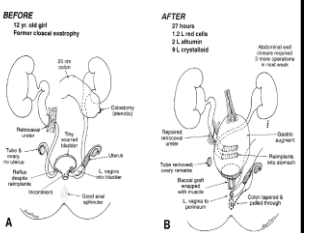
Surgical reconstruction

- Individualized repair of genitourinary and gastrointestinal defects
- Goals
  - Secure closure of bladder and anterior abdominal wall
  - Preservation of renal function
  - Prevention of short gut syndrome
  - Attainment of functional and cosmetically acceptable genitalia
  - Continence
- Timing of operative management varies with respect to strategies to narrow/secure pubic diastasis

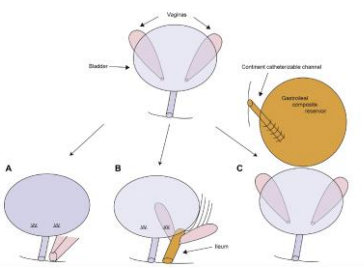
Cloacal Exstrophy

Initial Surgical approach

- Separation of bladder halves from cecal plate
- Closure of omphalocele
- Hindgut preservation
  - End colostomy
  - Colonic pull through
- Vaginal reconstruction
  - Native vagina or neovagina



Options for vaginal reconstruction



Pull-through vaginoplasty

Bowel vaginoplasty

vaginoplasty with native bladder

Cloacal Exstrophy

Factors affecting success

Initial bladder closure of the cloacal exstrophy complex: Outcome related risk factors and keys to success

Bhavik B. Shah [a,*], Heather Di Carlo [b], Seth D. Goldstein [c], Phillip M. Pierorazio [b], Brian M. Inouye [b], Eric Z. Massanyi [b], Adam Kern [b], June Koshy [d], Paul Sponseller [e], John P. Gearhart [b]

100 patients with CE and primary closure

- 26 patients with failed closure compared to 34 with successful closure

Table 2
Univariate logistic analysis of variables affecting primary closure failure.

Variable	Odds ratio	p-value	95% CI
46XY Genotype	1.030	0.956	0.353–3.007
Pre-closure diastasis (centimeters)	2.636	0.004	1.363–5.099
Delay between omphalocele closure and primary bladder closure	0.024	0.001	0.003–0.209
Age at closure (months)	0.894	0.002	0.833–0.960
Osteotomy	0.095	<0.001	0.028–0.320
External fixator	0.024	0.001	0.003–0.203
Delay between osteotomy and closure*	0.033	0.005	0.003–0.365

* Only calculated using patients who underwent osteotomy.

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How do you transition care?

What to do in your office

Urologic Congenitalism

Transition of Urologic Patients From Pediatric to Adult Care: A Preliminary Assessment of Readiness in Spina Bifida Patients

Heidi A. Stephany, Christina B. Ching, Melissa R. Kaufman, Amanda Squiers, Lisa Trusler, Douglass B. Clayton, John C. Thomas, John C. Pope IV, Mark C. Adams, John W. Brock III, and Stacy T. Tanaka

Contents lists available at ScienceDirect
Seminars in Pediatric Surgery
journal homepage: www.elsevier.com/locate/sempedsurg

Transitional care in pediatric urology

Sarah M. Lambert, MD[a,b,*]

Contents lists available at ScienceDirect
Seminars in Pediatric Surgery
journal homepage: www.elsevier.com/locate/sempedsurg

Transition from pediatric to adult surgery care for patients with disorders of sexual development

Kate A. McCracken, MD[a], Mary E. Fallat, MD[b,c,*]

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Transitioning care

Table 3
Adapted checklist for assessing if an adolescent or young adult with 46,XY DSD or 46,XX DSD is prepared to transition their health care to adult medical specialists

Health care skills	Health history knowledge
I have decided who will be my DSD physician for adult care. I can explain my DSD to unfamiliar physicians. I can find information about my condition online, and I know how to connect with DSD advocacy and support groups. I schedule and keep a calendar of my own medical appointments. I wear medic alert jewelry to alert others of my life-threatening allergies or conditions (when needed). I prepare and ask questions of my health care team members. I can explain side effects of my medications. I can explain complications associated with my DSD and how to avoid them. I know what symptoms of my DSD require urgent care and where to go for that care. I can describe how my DSD affects pubertal development, sexual functioning, and fertility. I keep records of my menstrual periods (when needed). I am informed about family planning and have access to contraceptives (when needed). I know how to connect with genetic counselors to discuss my condition. I perform breast self-exams (when needed). I perform testicular self-exams (when needed).	What is DSD? What type of DSD do you have? What medications do you currently take? How much and how often? Why do you take these medications? What happens if you take too much or too little? When and how was your DSD diagnosed? Have you had any surgeries for your DSD? If yes, what procedures and when? Do you have a copy of your medical records? If not, do you know how to get this? What is the natural history of your DSD (if known)? Are you fertile? Do you know what kinds of mental health and health care specialists are available to help you as you get older (e.g., psychiatrist, reproductive endocrinologist, and couples counselor)?

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Transition process

https://youngwomenshealth.org/2014/07/11/mrkh-transitioning-to-adult-gynecology-care/

- Learn about your health insurance coverage and the amount of your co–pay and/or deductibles.
- Contact the Medical Records Department where you currently have your GYN care and sign a release to have your records sent to your new gynecologist (and adult health care providers, if applicable) or pick up a copy and bring the documents with you to your first appointment.
- Make a list of all the medications you take and write down any allergies you have (if applicable).
- Create a brief timeline of your GYN/medical history: it's very useful to have the dates of diagnosis, treatment, names of your providers, etc. at your fingertips without having to search for this information.
- Know the names and phone numbers of all your health care providers, then store the contact information in your phone or someplace else where the information is readily available.
- Add your GYN appointments (and other medical appointments) in your calendar.
- If you have to change or cancel a GYN (or medical) appointment, make sure you call the office well in advance. Some medical offices will charge you for the visit unless you contact them 24–48 hrs. before your scheduled appointment.

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Are they ready

https://youngwomenshealth.org/2014/07/11/mrkh-transitioning-to-adult-gynecology-care/

- I can explain MRKH (and any other medical conditions I have) to my GYN and medical providers. (If not, it's very helpful to provide your GYN and other medical providers with a copy of the MRKH guide for health care providers.)
- I know the names and phone numbers of all of my health care providers.
- I ask questions during my GYN and other medical appointments.
- I know what medications I take and I have a list that I bring to my GYN and medical appointments. I tell my providers when I no longer take certain medicine(s) and when I start a new medicine(s).
- I feel comfortable responding to questions my gynecologist and other medical providers asks.
- I am able to schedule my GYN and other medical appointments by myself and I have a way of keeping track of them so I don't miss appointments.
- I know about my health insurance coverage and how much my co–pay is for different medical services.
- I know where and how to obtain a copy of my medical records.
- I am able to get to my GYN and other medical appointments by myself.
- I know where to get my prescriptions filled, and have called the pharmacy when I've had questions or needed refills.

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Transitioning care

What do you need to KNOW?

- Detailed description of surgical and medical history
- Fertility and pregnancy potential/ capability
- Sexual health/function
- Risks for other quality of life disorders (prolapse)
- Coordination and management of chronic conditions (incontinence, voiding dysfunction)

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Take home points

- GU anomalies are common and affect sexual health, fertility and the pelvic floor
- Care involves a multidisciplinary approach focusing on transition from pediatric to adult provider
- Anticipate the obstacles that these women face

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Surgical management of Pelvic Floor Disorders in women with congenital GU anomalies

- Transitioning Care: ICS 2018
- Wednesday, August 29, 2018
- Sarah A. Collins, MD

Overview

Surgical management o PFDs in women with GU anomalies

- Bladder Exstrophy- Epispadias complex
  - Predisposing factors for PFDs
  - Management of POP and UI
- MRKH: POP after neovagina
  - Case report evidence: presentation and management
- POP after surgery for Herlyn-Werner-Wunderlich Syndrome
  - Northwestern's experience
- CAH: Continence after repair of persistent urogenital sinus

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Exstrophy-Epispadias Complex

Epispadias[1]

Classic Bladder Exstrophy[2]

- Cloacal exstrophy[3]

[1]Shetty MV, Bhaskaran A, Sen TKAfrican journal of paediatric surgery : AJPS. 8(2):215-7
[2]https://en.wikipedia.org/wiki/Bladder_exstrophy, last updated 25 Juy 2018
[3]https://www.centrallakesclinic.biz/urinary-tract-2/exstrophy.html, last updated 20 April 2018

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Exstrophy-Epispadias Complex

Life long considerations

Urogynaecological and obstetric issues in women with the exstrophy–epispadias complex

R.I. MATHEWS, M. GAN and J.P. GEARHART
Division of Paediatric Urology, The James Buchanan Brady Urological Institute, Baltimore, MD, USA
BJU Int. 2003 Jun;91(9):845-9

- Series of 34 women who responded to mailed surveys
  - Female Epispadias: N= 4
  - Classical Bladder Exstrophy: N= 24
    - 10 with urinary incontinence
    - 10 with POP, mean age 16
    - 2 with rectal prolapse
  - Cloacal Exstrophy: N= 6
    - 1 with incontinence
    - 2 with POP at 21 and 24 years
    - 1 with rectal prolapse

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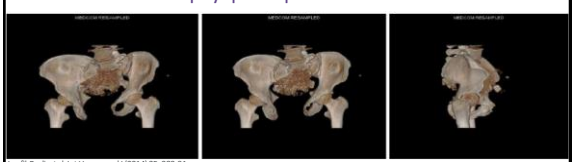
Bladder Exstrophy: predisposed to POP



Israfil-Bayli, et al. Int Urogynecol J (2014) 25: 989-91

- Skeletal abnormalities affecting muscular and connective tissue support:
  - Absent symphysis
  - Incomplete pubic rami
  - Incompletely formed sacrum
  - Absent coccyx
- 30-50% develop POP by middle age[1]

[1]Kaufman MR, Current Urology Reports (2018) 19:18

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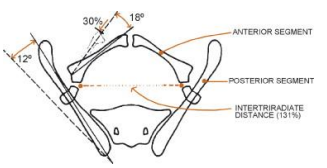
Bladder exstrophy: common reconstructive surgeries

- Modern Staged Repair of Bladder Exstrophy: MSRBE
  - Newborn: Closure of bladder, urethra, abdominal wall
  - 4-5 years: Bladder neck reconstruction with bilateral ureteral reimplantation
- Complete Primary Repair of Bladder Exstrophy: CPRBE
  - All repairs at once in first days of life
  - Many patients still require multiple operations
- Osteotomy:
  - Mean pubic diastasis
    - Normal: 0.6cm
    - Classic BE:
      - 4 cm at birth
      - 8 cm at age 10



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Bladder exstrophy: common reconstructive surgeries

- Pelvic osteotomy

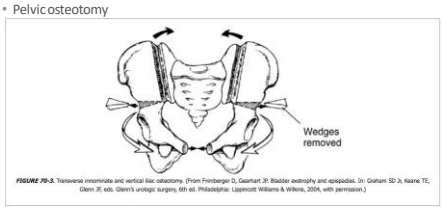

FIGURE 70-3. Transverse innominate and vertical iliac osteotomy. (From Frimberger D, Gearhart JP. Bladder exstrophy and epispadias. In: Graham SD Jr, Keane TE, Glenn JF, eds. Glenn's urologic surgery, 6th ed. Philadelphia: Lippincott Williams & Wilkins, 2004, with permission.)

J. Todd Purves, John P. Gearhart. EAU-EBU Update Series. Volume 5, Issue 5, Pages 188-196 (October 2007)

- Decreases tension on bladder and abdominal closures
- Does not appear to decrease risk of pelvic organ prolapse[1]

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[1]Ifeanyi A, et al. J Urol (2012) Vol. 188, 2343-2346

Classic Bladder Exstrophy

Prolapse

Genital prolapse in adult women with classical bladder exstrophy

Rola S. Nakhal · Rebecca Deans · Sarah M. Creighton · Dan Wood · Christopher R. J. Woodhouse

Int Urogynecol J (2012) 23:1201–1205

52 women after primary repair bladder exstrophy identified

- Mean age 33, mean number of GU surgeries 9
- 27 (52%) women had prolapse
  - 85% managed with surgery (hysterosacropexy)
    - 75% successful
  - 15% managed conservatively
- Repair of POP in BE patients also improves urinary continence and sexual function[1]

[1]Everett RG, et al. Female Pelvic Med Reconstr Surg 2017;23: 377–381

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Cloacal Exstrophy

Northwestern's Experience

- 23 yo with cloacal exstrophy spontaneously conceives
  - Pregnancy complications
    - Prolapse
    - Hospital admission for pyelo
    - Hospital admission for SBO managed conservatively
    - Hospital admission for HELLP
  - Classical C/S at 34 wks
- Symptomatic POP continued post-partum
  - Pessary not able to manage patient's symptoms
  - Underwent abdominal sacral colpopexy

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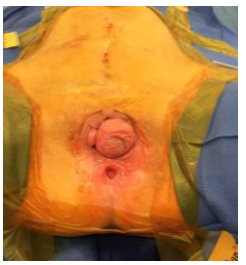
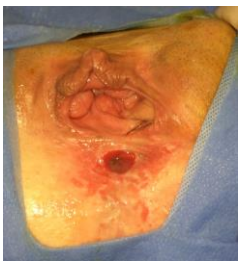
Cloacal Exstrophy

Prolapse before and after reconstructive surgery





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Classic Bladder Exstrophy

Continence

Examining long-term outcomes of bladder exstrophy: a 20-year follow-up

Angela D. Gupta, Sameer K. Goel, Christopher R.J. Woodhouse* and Dan Wood*

*Department of Urology, Johns Hopkins Medical Institutions, Baltimore, MD, USA, and *University College London Hospitals, London, UK*

BJU Int 2014; 113: 137–141

61 patients were identified (>20 years of age, men and women)

- All had undergone additional surgeries after their original reconstructive procedures
- 21 patients responded to this survey (15 men, 6 women)
  - 20 performed CISC
  - 1 was continent and self voiding
  - 13 patients completely continent, no leakage episodes on ICIQ

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Cloacal Exstrophy

Continence

Clinical Outcome of Cloacal Exstrophy, Current Status, and a Change in Surgical Management

Rob van Vliet[1] Luc A. J. Roelofs[2] Roxana Rassouli-Kirchmeier[1] Robert P. E. de Gier[2] Hedi L. Claahsen-van der Grinten[3] Chris Verhaak[4] Allard J. Hosman[5] Catharina C. M. Beerendonk[6] Erik J. van Lindert[7] Michel A. A. P. Willemsen[8] Marc H. W. A. Wijnen[1] Wout F. J. Feitz[2] Ivo de Blaauw[1]

- 14 patients identified with CE (5 women)
  - Initial bladder closure attempted in 13 cases, 9 initial failures
  - 5 underwent bladder neck reconstruction, 10 underwent later augmentation cystoplasty or diversion
  - 2 remain continent

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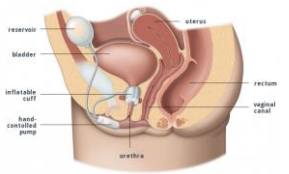
Exstrophy-Epispadias Complex

Urinary incontinence

- Requirements for urinary continence:
  - Adequate sphincteric resistance
  - Sufficient bladder capacity without overactivity
  - Bladder regimen
- Procedures available:
  - Bladder neck reconstruction (BNR)
  - Urethral slings
  - Artificial urinary sphincters
  - Urethral bulking
  - Bladder neck closure
  - Augmentation cystoplasty



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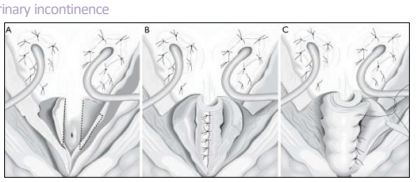
Exstrophy-Epispadias Complex

Urinary incontinence



Young–Dees–Leadbetter bladder neck reconstruction
Myers JB, et al. Transl Androl Urol. 2016 Feb;5(1):145-57

- Urethral bulking:
  - Can add a modest increase in continence when used after failed BNR
  - Series of 20 children (boys and girls) with CBE[1]:
    - 4 continent after BNR
    - Additional 2 continent after BNI
    - Even after additional surgeries, 7 remained incontinent

[1]Faure, A UROLOGY 108: 166–170, 2017

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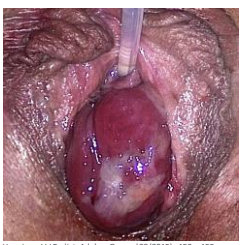
Prolapse of the neovagina

Christopoulos P. J Pediatr Adolesc Gynecol 24 (2011) e33-e34

Self-dilated neovagina ▲



Sigmoid neovagina ▶

Henninger V. J Pediatr Adolesc Gynecol 28 (2015) e153ee155

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Prolapse of the Neovagina

Self-dilation: primary repairs

- **Case report**: 21 year old with MRKH who attained a 10 cm vagina with self-dilation and maintained it with intercourse developed prolapse beyond the hymen. This was repaired with a mesh augmented bilateral sacrospinous ligament suspension complicated by a mesh erosion.[1]
- **Case report**: 23 year old with MRKH who attained a 7.5 cm vagina with self-dilation (from a 3 cm dimple at presentation) developed complete vaginal eversion. This was repaired with a laparoscopic sacral colpopexy, and vagina lengthened to 9 cm postoperatively.[2]
- **Case report**: 42 year old with MRKH who attained a 7 cm vagina with self-dilation at age 17 developed stage 3 apical prolapse. This was repaired with a laparoscopic "nerve-sparing" suspension of the vagina with polypropylene mesh and polyester suture to the anterior longitudinal ligament at L5.[3]

[1]Burns E. J Pediatr Adolesc Gynecol 25 (2012) e75-e76
[2]Christopolous P. J Pediatr Adolesc Gynecol 24 (2011) e33ee34
[3]Henninger V. J Pediatr Adolesc Gynecol 28 (2015) e153ee155

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Prolapse of the Neovagina

Sigmoid neovagina: primary repairs

- **Case report:** A 41 year old with MRKH who underwent sigmoid neovagina creation at age 17 presented with stage 3 apical prolapse and a "bearing down" sensation. She underwent laparoscopic "nerve-sparing" suspension of the vagina with a hybrid monocril / polypropylene mesh and polyester with polyglactin suture to the anterior longitudinal ligament at L5.[1]
- **Case report**: A 72 year old with MRKH who underwent sigmoid neovagina creation at age 21 presented with stage 4 apical prolapse. She underwent laparoscopic sacral colpopexy with polypropylene mesh and polyester suture.[2]

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[1]Henninger V. J Pediatr Adolesc Gynecol 28 (2015) e153-e155
[2]Popov A. Int Urogynecol J (2016) 27:315–316

Prolapse of the Neovagina

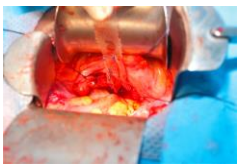
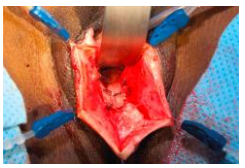
Recurrences and their repairs

- 28 year old with MRKH
  - Self-dilated at age 19 and achieved intercourse
  - 8 years later: vaginal prolapse beyond the hymen repaired by a community urologist:
    - Anterior and Posterior repair with AMS Elevate mesh
    - Transobturator midurethral sling
  - 1 year postoperatively: complete vault eversion, TVL 4 cm, scarring
  - Staged repair:
    - Mesh removal followed by postoperative dilation
    - 8 months later:
      - Abdominal sacral colpopexy with polypropylene mesh and absorbable suture
      - Posterior vaginal extension using cadaveric dermis
    - Postoperative vaginal dilation and vaginal estrogen for 3 months
    - 6 months after surgery: excision / fulguration of posterior granulation tissue
- 1 year follow up:
  - Aa, –3; Ba, –3; C, –5;Gh, 3.5; Pb, 3; TVL, 7.5; Ap, –2; and Bp, –2

Toidze TV. Female Pelvic Med Reconstr Surg 2015;21: e33–e35

Northwestern Medicine

Prolapse of the Neovagina
Recurrences and their repairs

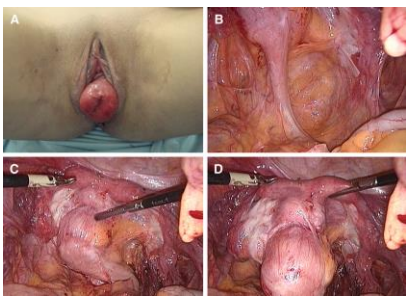
Toidze TV. Female Pelvic Med Reconstr Surg 2015;21: e33–e35

Prolapse of the Neovagina
Recurrences and their repairs

- 45 year old with MRKH presented after multiple surgeries for POP of her sigmoid neovagina with a feeling of "bearing down" and increased vaginal discharge
  - Original sigmoid vaginoplasty age 34
  - At age 40, she developed symptomatic prolapse
    - Laparotomy with mesh-augmented repair: Recurred on POD #15
    - 2 years later, mesh-augmented vaginal repair: Recurred after 3 years
    - Colposuspension to the round ligaments: Recurred POD #0
  - On presentation: protrusion of neovagina to 5 cm beyond the hymen
  - Repair:
    - Laparoscopic sacral colpopexy
      - Polypropylene mesh
      - Polyester sutures
  - Follow up: Good symptom control with no anatomic recurrence at 40 days, 3 months, 6 months

Kondo W. Journal of Minimally Invasive Gynecology (2012) 19, 176–182

Prolapse of the Neovagina
Recurrences and their repairs

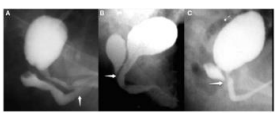


Kondo W. Journal of Minimally Invasive Gynecology (2012) 19, 176–182

Herlyn-Werner-Wunderlich Syndrome

- 17 yo with a müllerian anomaly presents with pain and abnormal bulge in vagina when urinating
  - PMH:
    - Uterine didelphyis –Right vaginal septum and associated hematocolpos, L solitary kidney
  - PSH:
    - 2007: resection of right transverse vaginal septum
    - 2011: repair of "anterior vaginal wall hernia"
  - Ultimately required repair of vaginal wall defect with graft

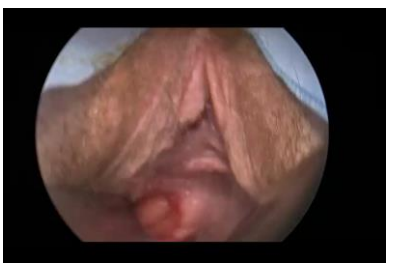
CAH: Persistent urogenital sinus



- TUM procedure: Total urogenital mobilization
- Retrospective chart review of children with PUGS
  - Intermediate and high defects
  - Follow up: subjective report of continence

Bailez MM, et al. Urinary continence following intermediate and high urogenital sinus (UGS) in CAH: Experience with 55 cases Frontiers in Pediatrics. July2014 | Volume2 | Article67 | 3

Complications of excision transverse vaginal septum



Key Facts

Northwestern Medicine

In summary…

- GU anomalies predispose women to POP and UI
- Knowledge of common reconstructive surgeries
  - Operative reports
- In patients with **Exstrophy-Epispadias Complex**:
  - POP may be best managed with sacral colpopexy after childbearing
  - Bulking may improve urinary incontinence after BNR
- **MRKS**: TV mesh may lead to failure and future revision surgeries
- **Herlyn-Werner-Wunderlich Syndrome:**
  - Complications of transverse septum resection: POP

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Questions?

Northwestern Medicine

Thank You

Northwestern Medicine

Northwestern Medicine

Sexual Function in women with complex GU anomalies

Maureen Sheetz APRN, CNP
AASECT Certified Sexual Counselor
Division of Female Pelvic Medicine & Reconstructive Surgery

Let's talk about sex

- Sexual activity is attainable in this population
- Many women have barriers to satisfactory sexual function
- Must address this proactively
  - Goal: Address before they have pain

Elements of female sexual function

- Sexual desire
- Arousal
- Orgasm
- Pain

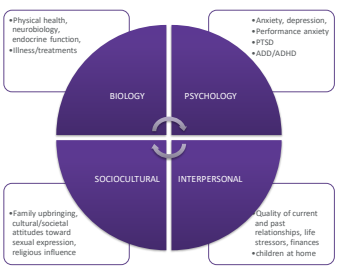
- Sexual symptoms are not considered a dysfunction unless they cause personal distress for the individual
- Sexuality is always a couple issue—not just the one who appears to be presenting with the problem

Components of healthy sexuality

Brief overview

- Share pleasure
- Deepen and reinforce intimacy
- Achieve desired pregnancy
- Decrease tension and to alleviate the stresses inherent in life and relationships
- Energize and reinforce a feeling of desire and desirability

Evaluation: Bio-Psycho-Social approach



Adapted from Kinsberg and Reszaee (2013)

Sexual Dysfunction

DSM V vs Sexual Medicine

- Female sexual interest/arousal disorder
- Female orgasmic disorder
- Genito-pelvic pain/penetration disorder

- Hypoactive sexual desire disorder
- Female sexual arousal disorder
- Female orgasmic disorder
- Persistent genital arousal disorder
- Vulvar pain caused by a specific disorder
- Vulvodynia
  - Generalized vulvodynia
  - Provoked localized vestibulodynia

Pain and intimacy

Pain also negatively affects:

-desire

-arousal

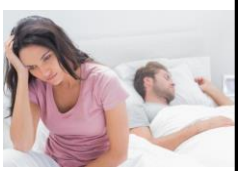
-orgasm

Partner effects of dyspareunia

- Also affected by dyspareunia
- Helpless, angry and depressed
- Do not understand what is going on
  - Think partner is avoiding sex for other reasons
  - Take it personally
  - Think partner doesn't find them attractive
  - Feel rejected
- Even those who understand what's going on → can inadvertently contribute to relationship problems by avoiding any type of physical intimacy

Sexual dysfunction in women with complex GU anomalies

- Reconstructive vaginoplasties
  - Childhood vs later in life
  - Scarring/Stricture
  - Adequate length for intercourse
  - Pelvic floor dysfunction
  - Concomitant pelvic floor disorders
  - Emotional considerations (body image)



Mo's goals in the transitions clinic

- Prevent sexual dysfunction as sequelae of vaginal reconstructive surgery
- Prepare women for a healthy sexual relationship
- Educate women on their anatomy
- Address sexual function and concerns if and when the arise

Mo's recipe

- Pre-operative consultation
- Post-operative close follow up
- Age appropriate history
  - Any sexual concerns
  - Any sexual activity
  - Any pelvic floor concerns
- Physical exam
  - Length and caliber of vagina
  - Assessment of vagina epithelium
  - Assessment of vaginal scarring
  - Assessment of pelvic floor musculature

Maintaining or restoring vaginal length/caliber

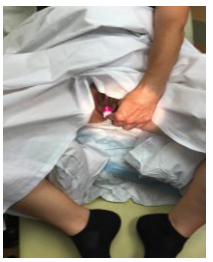
- Dilation therapy is critical
- Self dilation 2-3 times daily immediately post-op
- Dilating schedule/duration based on goals

Dilating 101

The right equipment

Dilating 101

- Set expectations pre-op
- Introduce dilating ASAP postop
- Close follow-up
- Weekly visits
- Allow patient to self demonstrate dilating and progress
- Premedicate with lidocaine gel

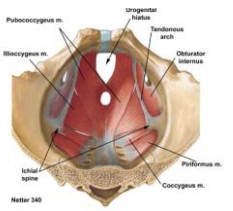


Vaginal estrogen

- Great adjunct to dilating
  - Post vecchietti- vaginal epithelium retains estrogen receptors
  - Helps prevent scarring in septum resections
  - Insert 0.5 mg daily x 2wks, then maintenance twice weekly
  - Not well studied in this population
  - Can be helpful in CAH

Pelvic Floor Physical Therapy

- Assess for myofascial pelvic floor dysfunction
  - Resultant from surical procedures
  - Resultant from dyspareunia
- Additional musculoskeletal abnormalities
- PT can be an important adjunct to dilator therapy



Vaginal Septa

Original Studies

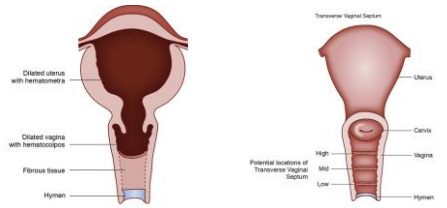
Presenting and Long-Term Clinical Implications and Fecundity in Females with Obstructing Vaginal Malformations

Minna M. Joki-Erkkilä, MD[1], and Pentti K. Heinonen, MD[1,2]

[1]Department of Obstetrics and Gynecology, Tampere University Hospital, and [2]Medical School, University of Tampere, Tampere, Finland

- Women can develop scar tissue, most often in area of resection concentric scar at the level of the previous septum
- 2of the 3 patients with resection of TVS required re-op for stricture
- Little known on long term sexual dysfunction

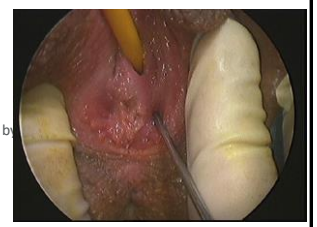
Vaginal septae



Congenital Absence of Vagina

Mayer Rokitansky Küster Hauser Syndrome

- Unique challenges
  - Body image
  - Coitarche
  - Non-surgical versus various surgical procedures
  - Many have had several procedures- dilating followed by surgical management



Sexual and functional results after creation of a neovagina in women with Mayer–Rokitansky–Küster–Hauser syndrome: a comparison of nonsurgical and surgical procedures

Karine Morcel [a,*], Vincent Lavoué [a], Frédérique Jaffre [a], Bernard-Jean Paniel [b], Roman Rouzier [c]

Table 2
Female Sexual Function Index scores for the two groups.

Domain	Nonsurgical group ($n=20$)	Surgical group ($n=20$)	p
Desire	4.5 ± 1.0	4.6 ± 0.8	0.5
Arousal	4.4 ± 1.6	4.3 ± 1.7	0.7
Lubrication	4.2 ± 2.0	4.3 ± 1.8	0.8
Orgasm	4.0 ± 1.8	3.8 ± 1.9	0.6
Satisfaction	4.7 ± 1.6	4.7 ± 1.7	1.0
Comfort	3.4 ± 1.9	3.6 ± 2.1	0.6
Total FSFI score	25.3 ± 7.5	25.3 ± 8.0	1.0

Values are given as mean ± standard deviation (95% confidence interval).

GYNECOLOGY

Surgery is not superior to dilation for the management of vaginal agenesis in MRKH syndrome: a multicenter comparative observational study in 131 patients

Alaa Cheikhelard, MD[1]; Maud Bidet, MD[1]; Amandine Baptiste; Magali Viaud; Christine Fagot, MD; Naziha Khen-Dunlop, MD, PhD; Christine Louis-Sylvestre, MD; Sabine Sarnacki, MD, PhD; Philippe Touraine, MD, PhD; Caroline Elie, MD; Yves Aigrain, MD, PhD; Michel Polak, MD, PhD; for the French MRKH Study Group

Vaginal length and Sexual Function in MRKH

TABLE 7
Vaginal length and sexual quality of life according to surgical techniques

Surgical technique	Vaginal length, cm	FSFI score	FSDS-R score
Vecchietti, n = 6	11.3 [11–12]	30.2 [18.7–34.8]	13 [10–39]
Sigmoid, n = 57	11 [6–15]	25.7 [2.8–34]	20.5 [0–50]
McIndoe, n = 5	12 [11–13]	28.4 [8.4–34.8]	41 [0–52]
Davidov, n = 8	8.5 [7–11]	23.0 [4.8–33.6]	8 [0–41]
Dupuytren, n = 8	9.3 [8–12]	27.9 [15.3–34]	14.5 [1–32]
P	.002	.28	.49

FSDS-R, Female Sexual Distress Scale-Revised; FSFI, Female Sexual Function Index.
Cheikhelard et al. Quality of life in MRKH: surgery vs dilation vaginoplasty. Am J Obstet Gynecol 2018.

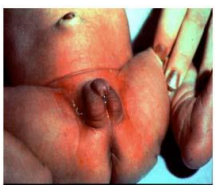
TABLE 8
Female Sexual Function Index scores according to type of management

Type of management	Global FSFI score	Desire	Excitation	Lubrication	Orgasm	Satisfaction	Pain
All patients	26 [2.6–34.80]	4.2 [1.2–6]	4.5 [0–6]	4.8 [0–6]	4.4 [0–6]	5.2 [0.8–6]	3.6 [0–6]
Surgery (1) n = 84	26 [2.8–34.8]	4.2 [1.2–6]	4.5 [0–6]	4.8 [0–6]	4.2 [0–6]	4.8 [0.8–6]	3.2 [0–6]
Dilation (2) n = 25	24.7 [2.6–34.4]	4.5 [1.8–5.4]	4.4 [0–5.7]	4.7 [0–6]	3.6 [0–6]	4.8 [0.8–6]	3.6 [0–6]
Intercourse (3) n = 18	30.2 [7.8–34.8]	4.5 [3–6]	4.5 [0–6]	4.7 [0–6]	4.8 [0–6]	6 [1.2–6]	5.4 [0–6]
	***P* = .044**[a]	*P* = .17	*P* = .57	*P* = .57	*P* = .33	***P* = .04**[b]	*P* = .22

Global FSFI score in general population of French women: <30 y: 24.9/30–39 y: 25.7.
FSFI, Female Sexual Function Index.
Cheikhelard et al. Quality of life in MRKH: surgery vs dilation vaginoplasty. Am J Obstet Gynecol 2018.

CAH

Total urogenital sinus mobilization (TUM)



- Vaginoplasty typically undertaken at birth
- Girls at risk for stricture and vaginal stenosis
- Mobilized tissue from UG sinus can be used for vaginoplasty
- Clitoroplasty

CAH

Sexual function

Sexual Function and Attitudes Toward Surgery After Feminizing Genitoplasty

Riitta Fagerholm, Pekka Santtila, Päivi J. Miettinen, Aino Mattila, Risto Rintala and Seppo Taskinen*

- Assessment of sexual function using FSFI
- 24 women (16 with CAH)
  - Clitoroplasty (mean age 3.8 years)
  - Vaginal reconstruction (mean age 4.5 years)
    - 43% required surgical revision for narrowed vagina
    - 54% required vaginal dilation under anesthesia

CAH

Sexual function

Table 2. *Sexual activity and prevalence of sexual function problems*

	No. Pos Answers/Total No. Answers (%)			
	CAH	AIS	CAH + AIS	Controls
Sexually active with a partner	7/11 (64)*	5/7 (71)	12/18 (67)*	854/985 (86.7)
Sexual desire only seldomly	3/10 (30)	1/7 (14)	4/17 (24)	591/897 (65.9)
Sexual arousal only seldomly	1/8 (13)	1/7 (14)	2/15 (13.3)	41/831 (4.9)
Lubrication only seldomly	0/7 (0)	2/7 (29)	2/14 (14.3)	26/819 (3.2)
Orgasm only seldomly	3/7 (43)	2/7 (29)	5/14 (35.7)	192/821 (23.4)
Frequent pain during penetration	0/6 (0)	0/5 (0)	0/11 (0)	35/741 (4.7)

* Difference was significant ($p < 0.05$) compared to controls.

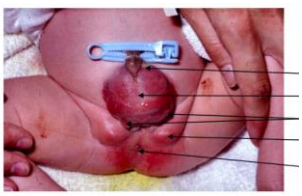
Table 3. *FSFI domain scores in sexually active patients and age matched sexually active controls*

	No. (mean ± SD score)					
	CAH		AIS		CAH + AIS	Controls
Desire	10	(4.0 ± 1.5)	7	(4.5 ± 1.6)*	17	(4.2 ± 1.5)*	885	(3.2 ± 0.9)
Arousal	7	(5.1 ± 0.6)	7	(5.0 ± 1.7)	14	(5.0 ± 1.2)	810	(5.0 ± 0.9)
Lubrication	7	(5.6 ± 0.5)	7	(4.5 ± 2.1)	14	(5.0 ± 1.6)	802	(5.8 ± 0.7)
Orgasm	7	(4.2 ± 2.0)	6	(4.2 ± 1.6)	14	(4.2 ± 1.7)	807	(4.5 ± 1.4)
Satisfaction	7	(4.9 ± 0.8)	5	(5.6 ± 0.4)	12	(5.2 ± 0.7)	748	(5.0 ± 1.0)
Pain	7	(4.7 ± 0.7)*	4	(5.1 ± 0.9)	10	(4.9 ± 0.7)*	726	(5.4 ± 0.8)
Total score	7	(28.7 ± 3.6)	4	(32.3 ± 1.9)†	11	(30.0 ± 3.5)	697	(28.9 ± 3.8)
No./total (%) abnormal total score (less than 26.55)	2/7	(29)	0/4	(0)	2/11	(18)	158/697	(22.7)

* Difference was very significant ($p < 0.01$) compared to controls.
† Difference was significant ($p < 0.05$) compared to controls.

Classic Bladder Exstrophy

Anatomic manifestations



Pelvic Floor:
-Diastasis of pubic bone
-Posterior deviation of levators

Genitalia:
-Bifid clitoris
-Short or stenotic vagina

Classic Bladder Exstrophy

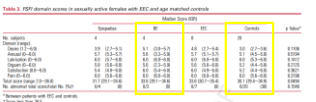
Sexual Health

Sexual Function in Patients Operated on for Bladder Exstrophy and Epispadias

Janne S. Suominen,* Pekka Santtila and Seppo Taskinen

THE JOURNAL OF UROLOGY®

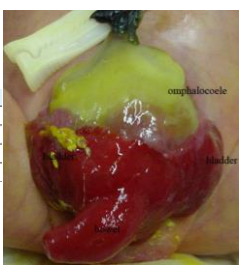
- 21 women with bladder exstrophy
  - Overall total FSFI score in cases vs age-matched controls
  - Later onset of sexual activity
  - 4 patients underwent revision vaginoplasty for stenosis



Cloacal Exstrophy

OEIS Complex (omphalocele, exstrophy of bladder, imperforate anus, spinal abnormalities)

Genital (XX)	(*n* = 7)	%
Vagina aplasia	1	14
Vagina duplex	5	71
Clitoris aplasia	1	14
Uterus didelphys	7	100



Cloacal Exstrophy

Life long considerations

Urogynaecological and obstetric issues in women with the exstrophy–epispadias complex

R.I. MATHEWS, M. GAN and J.P. GEARHART
Division of Paediatric Urology, The James Buchanan Brady Urological Institute, Baltimore, MD USA

Accepted for publication 5 February 2003

14 women included in analysis with cloacal exstrophy

6 patients underwent genital reconstructive surgery as part of the closure surgeries

Cloacal Exstrophy

- Sexual function
  - 4/6 women had further genital surgery
  - 3/5 women (>18 years) had intercourse
    - 2 reported sexual satisfaction
    - 1 discontinued sexual activity 2/2 uterine prolapse
  - 2 patients reported that they were not sexually active due to the appearance of their genitalia

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Take home points

- Women in this population are sexual and can have a healthy functional sexual relationship
- Many women have barriers to satisfactory sexual function
- Must address this proactively
- Remember birth control or STI prevention if indicated!

Northwestern Medicine

Thank you!

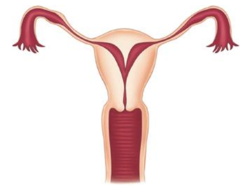
Northwestern Medicine

Genitourinary Anomalies Infertility and Miscarriage

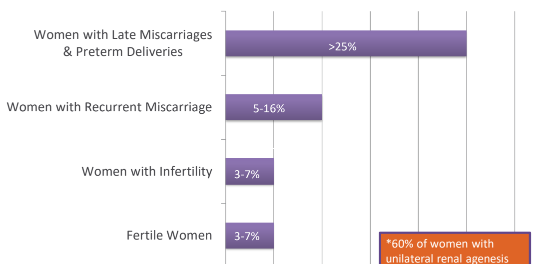
- Dana McQueen, MD, MAS
- Fellow
- Reproductive Endocrinology and Infertility
- Northwestern University

Genitourinary Anomalies and Fertility

1. Mullerian Anomalies
   - Unicornuate
   - Didelphys
   - Bicornuate
   - Uterine Septum
2. Congenital Adrenal Hyperplasia
   - Fertility implications and treatment
3. Mayer-Rokitansky-Kuster-Hauser Syndrome
   - Uterine Transplantation



Prevalence of Mullerian Anomalies



*60% of women with unilateral renal agenesis have genital anomalies

Acien P. Incidence of Mullerian defects in fertile and infertile women. Hum Reprod 1997;12:1372.
Saravelos SH, et al. Prevalence and diagnosis of congenital uterine anomalies in women with reproductive failure: a critical appraisal

Mullerian Anomalies: Reproductive outcomes

Anomaly	*Conception rate*	*First-trimester miscarriage*	*Second-trimester miscarriage*	*Preterm labor*	*Malpresentation at delivery*
Arcuate uterus	1.03 (0.94–1.12)	1.35 (0.81–2.26)	2.39 (1.33–4.27)**	1.53 (0.70–3.34)	2.53 (1.54–4.18)***
Canalization defects					
Subseptate	0.80 (0.57–1.11)	2.94 (1.90–4.54)***	1.86 (0.56–6.22)	2.01 (1.16–3.51)*	5.29 (1.89–14.86)**
Septate	0.93 (0.75–1.17)	2.37 (1.64–3.43)***	3.74 (1.57–8.91)**	2.30 (1.46–3.62)***	6.15 (3.96–9.53)***
All	0.86 (0.77–0.96)*	2.89 (2.02–4.14)***	2.22 (0.74–6.65)	2.14 (1.48–3.11)***	6.24 (4.05–9.62)***
Unification defects					
Bicornuate	0.86 (0.61–1.21)	3.40 (1.18–9.76)*	2.32 (1.05–5.15)*	2.55 (1.57–4.17)***	5.38 (3.15–9.19)***
Didelphys	0.9 (0.79–1.04)	1.10 (0.21–5.66)	1.39 (0.44–4.41)	3.58 (2.00–6.40)***	3.70 (2.04–6.70)***
Unicornuate	0.74 (0.39–1.41)	2.15 (1.03–4.47)*	2.22 (0.53–9.19)	3.47 (1.94–6.22)***	2.74 (1.30–5.77)**
All	0.87 (0.68–1.11)	2.56 (0.89–7.38)	1.94 (0.92–4.09)	2.97 (2.08–4.23)***	3.87 (2.42–6.18)***

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Mullerian Anomalies: Reproductive outcomes

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Arcuate uterus	1.03 (0.94–1.12)	1.35 (0.81–2.26)	2.39 (1.33–4.27)**	1.53 (0.70–3.34)	2.53 (1.54–4.18)***
Canalization defects					
Subseptate	0.80 (0.57–1.11)	2.94 (1.90–4.54)***	1.86 (0.56–6.22)	2.01 (1.16–3.51)*	5.29 (1.89–14.86)**
Septate	0.93 (0.75–1.17)	2.37 (1.64–3.43)***	3.74 (1.57–8.91)**	2.30 (1.46–3.62)***	6.15 (3.96–9.53)***
All	0.86 (0.77–0.96)*	2.89 (2.02–4.14)***	2.22 (0.74–6.65)	2.14 (1.48–3.11)***	6.24 (4.05–9.62)***
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Bicornuate	0.86 (0.61–1.21)	3.40 (1.18–9.76)*	2.32 (1.05–5.15)*	2.55 (1.57–4.17)***	5.38 (3.15–9.19)***
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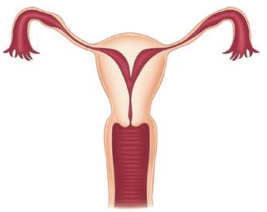
Northwestern Medicine

Mullerian Anomalies: Diagnosis

Diagnosis

- Gold Standard
  - Hysteroscopy and Laparoscopy
- HSG or Hysteroscopy alone
  - Insufficient to evaluate the contour of the uterine fundus
- 3D Ultrasound +/- SIS
  - 3D Ultrasound alone: 88% Accuracy
  - 3D Ultrasound + SIS: 100% Accuracy
- MRI



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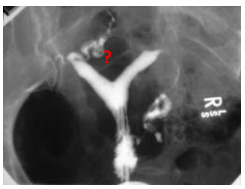
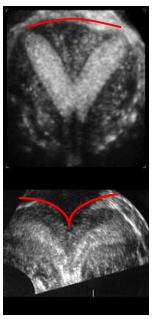
Mullerian Anomalies: Diagnosis

- HSG



- U/S



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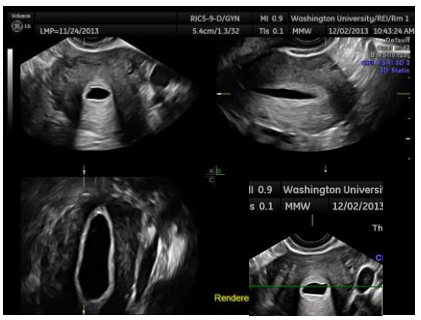
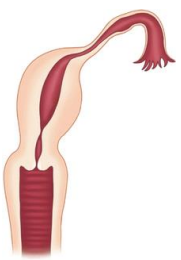
Unicornuate



Northwestern Medicine

Unicornuate Uterus

- Pathophysiology: Failure of development of one mullerian duct
- Reproductive Outcomes:
  - Miscarriage (25-30%)
  - Ectopic Pregnancy (3-4%)
    - Rudimentary Horn
  - Preterm delivery (40%)
  - IUGR (10%)
  - Malpresentation
- Rudimentary horn with endometrium



Northwestern Medicine

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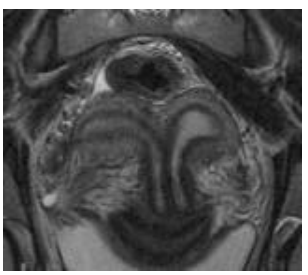
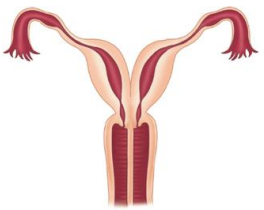
Uterus Didelphys



Northwestern Medicine

Uterine Didelphys

- Pathophysiology: Complete failure of fusion of the mullerian ducts and normal differentiation of each to form a cervix and hemi-uterus
- Reproductive outcomes:
  - No impact on fertility
  - Increased risk preterm labor and malpresentation
- No evidence to support surgical treatment, except for excision of vaginal septum



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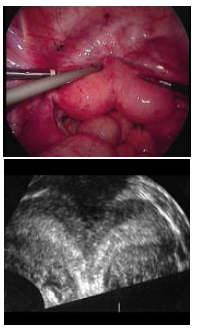
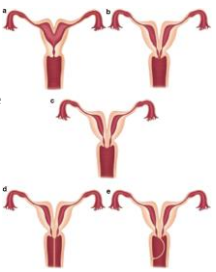
Bicornuate



Northwestern Medicine

Bicornuate Uterus

- Pathophysiology: Incomplete fusion of the mullerian ducts at the level of the fundus, creating two separate uterine cavities.
  - One lower uterus and single cervix
  - External midline cleft
- Reproductive Outcomes
  - 30-40% pregnancies end in miscarriage
  - Increased risk of preterm delivery
  - Increased risk of malpresentation
- Management
  - Metroplasty is no longer considered



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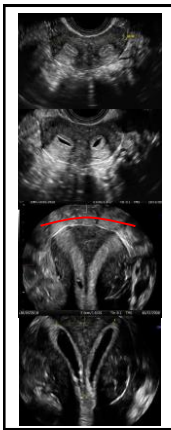
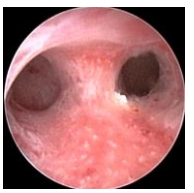
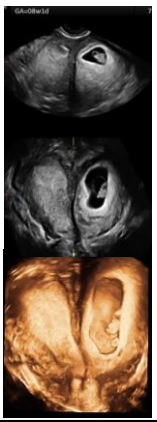
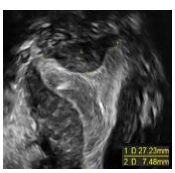
Septum

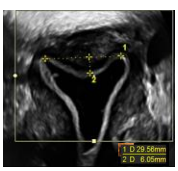


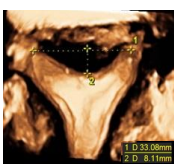


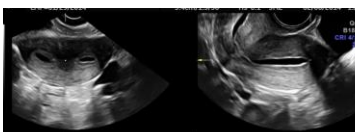


Arcuate









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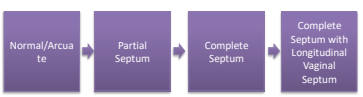
Uterine Septum

Definitions

- ESHRE
  - Internal indentation extending > 50% of myometrial wall thickness
- ASRM
  - Normal/Arcuate: < 1.5cm
  - Septate: > 1.5cm
  - Bicorunate: External fundal indentation > 1cm



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Uterine Septum: Fertility

- Fertility
  - Venetis et al, 2014
    - Septum with decreased probability of natural conception
    - RR 0.86, 95% CI 0.77 to 0.96; three studies
  - Tomazevic et al, 2010
    - Lower pregnancy and live birth rates in those with a septum vs. controls
      - 12.4% vs 29.2%, P= 0.001 (Pregnancy Rate)
    - Pregnancy rates higher after incision
      - OR 2.5 (95% CI 1.5-4.1, P< 0.001)

Northwestern Medicine

Uterine Septum: Miscarriage

Obstetrical Outcomes

- Miscarriage
  - Kupesic et al, 2002
    - 689 women with septum vs. 15,060 women in general population
    - Early miscarriage: 41.1% vs. 12.1%
    - Late miscarriage and preterm delivery: 12.6% vs 6.9%
  - Saygili et al 2003
    - Retrospective case series
    - 361 patients with septum and primary infertility or RPL
    - Miscarriage rate decreased from 91.8% to 10.4% following septum incision

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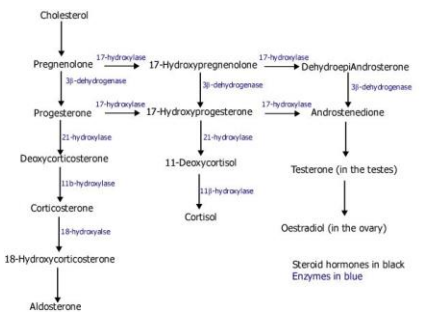
Congenital Adrenal Hyperplasia



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Congenital Adrenal Hyperplasia: Fertility

- Congenital Adrenal Hyperplasia
  - Most frequently encountered genetic steroid disorder affecting fertility
- Classic Disease: 1/16,000
  - Cortisol deficiency
  - Virilization
- Non-classic CAH: 1/600
  - Often asymptomatic
  - Elevated androgen precursors from the adrenals lead to impaired fertility → Often presenting symptom leading to diagnosis
  - Can present similarly to PCOS

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Congenital Adrenal Hyperplasia: Fertility

- Elevated Androgens
  - Alter GnRH pulse generator leading to elevated LH levels
    - Treatment with glucocorticoids leads to decreased androgens and normalization of LH levels
  - Impact Ovarian Function
    - Adrenal androgens directly inhibit folliculogenesis by negative feedback on granulosa cell aromatase activity

Androgens

- Elevated Progesterone
  - Alter GnRH pulse frequency
  - Impact endometrial development
  - Thicken cervical mucus

Progesterone

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Congenital Adrenal Hyperplasia: Fertility

- Altered psychosocial development
  - Exposure to adrenal androgens in utero
  - Females with classic CAH can exhibit masculinized behaviors including childhood play
- Virilization of external genitalia associated with impaired sexual functioning
  - Sexual intercourse can be prohibitively uncomfortable

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Congenital Adrenal Hyperplasia: Preconception Counseling

- Classic CAH
  - Carrier frequency 1:62
  - Likelihood of having an affected child 1:120
- Non-classic CAH
  - Carrier frequency 1:5-1:16
  - Likelihood of having an affected child 1:32
- Recommend screening partner for carrier status and can offer Preimplantation genetic testing of embryos if desired

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Congenital Adrenal Hyperplasia: Fertility Treatments

- Classic CAH→ Nearly all require treatment to ovulate
  - Ovulation using only steroid maintenance therapy
  - May need additional corticosteroids to suppress adrenal progesterone production
- Non-Classic CAH
  - Androgen excess frequently correctable with glucocorticoid treatment alone
  - Ovulation induction with letrozole or clomiphene

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Mayer-Rokitansky-Kuster-Hauser Syndrome

- Mullerian Agenesis
  - Absence of the vagina
  - Absent or hypoplastic uterus
  - Normal or hypoplastic fallopian tubes
  - Normal ovaries
  - Normal breast and pubic hair development
  - Primary Amenorrhea
- Pregnancy achieved through IVF and surrogacy
  - IVF challenging secondary to ovaries high in pelvis and lack of vagina for transvaginal ultrasound guided oocyte aspiration
  - May require abdominal oocyte retrieval

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Headlines

World's First Womb-Transplant Mother Hopes to Inspire Others

International

A First: Uterus Transplant Gives Parents A Healthy Baby

OCTOBER 04, 2014 10:10 AM ET

Health

First womb-transplant baby born

By James Gallagher
Health editor, BBC News

4 October 2014 | Health

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Earliest Attempts

- 1931
  - Lili Elbe, a transgender woman, died from organ rejection 3 months after receiving a uterine transplant
- 2000
  - Saudi Arabia. Transplantation of a uterus from a 46 yo hysterectomy patient to a 26 yo recipient
  - Uterus functioned for 99 days and then was removed for thrombosis and uterine necrosis
- 2011
  - First uterus transplant from a deceased donor was performed on Derya Sert in Turkey
  - First pregnancy, however pregnancy ended in miscarriage

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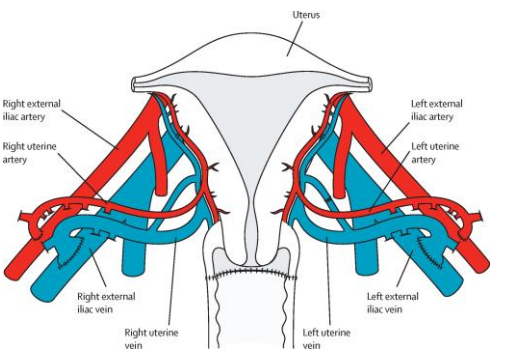

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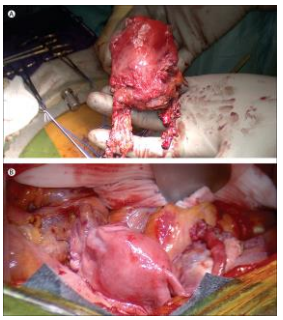

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Live Birth: The Recipient and Donor

- 36 year old Swedish women
  - Diagnosed with Rokitansky syndrome at 15 years of age

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Summary

- Congenital GU anomalies can have significant impacts on fertility and pregnancy outcomes
- Appropriate diagnosis can be achieved with 3D ultrasound +/- saline
- Correction of a uterine septum can improve fertility and decrease miscarriage rates
- Pregnancy is possible in women with CAH with steroid hormone replacement and/or ovulation induction
- Women with MRKH can have success with the use of IVF and a gestational surrogate. Investigation into experimental treatment with uterine transplant is ongoing.

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References

- Fritz M, Speroff L. Clinical Gynecologic Endocrinology. 2010
- Yen & Jaffe. Reproductive Endocrinology. 2019
- Uterine Septum, A guideline: Practice Committee of the American Society of Reproductive Medicine
- Shuiqing M, Xuming B, Jinghe L. Pregnancy and its outcome in women with malformed uterus. Chin Med Sci J 2002;17:242-5
- Maneschi F, Zupi E, Marconi D, Valli E, Romanini C, Mancuso S. Hysteroscopically detected asymptomatic mullerian anomalies. Prevalence and Reproductive implications.
- Venetis CA, Papadopoulos SP, Campo R, Gordts S, Tarlatzis BC, Grimbizis GF, Clinical implications of congenital uterine anomalies: a meta-analysis of comparative studies. Repro Biomed Online 2014; 29:665-83
- Tonguc EA, Var T, Batioglu S, Hysteroscopic metroplasty in patients with a uterine septum and otherwise unexplained infertility. Int J Gynaecol Obst 2011; 113:128-30
- Kupesic S, Kurjac A, Skenderovic S, Bjelos D. Screening for uterien abnormalities by three-dimentional ultrasound improves perinatal outcome. J Perinatal Med. 2002; 30: 9-17
- Tonguc EA, Var T, Yilmaz N, Batioglu S. Intrauterine device or estrogen treatment after hysteroscopic uterine septum resection. Int J Gynaecol Obset 2010; 109:226-9
- Reichman D, White P, New M, Rosenwaks Z. Fertility in patients with congenital adrenal hyperoplasia. Fertility and Sterility. 2014;101(2):301-309

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Thank You

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