

Complications of Ectopic Ureteroceleles & Ureters Seen In Transitional Urology

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Two Components in the Practice of Transitional Urologic Care

- Provide follow up care for complications that may arise from the treatment of congenital GU anomalies and childhood tumors
 - 97% of practice
- Transition our knowledge to **adults** to care for a **newly diagnosed congenital anomaly**
 - 3% of practice

Impact of Technology on the Dx & Rx Ectopic Ureteroceleles and Ureters

- Two Era's
 - Pre and Post Routine Maternal-Fetal US
 - 1980
- Historically huge impact on
 - Method of Dx
 - Coexisting pathology
 - Operation recommended

Brown et al, Am J Rad 148:1987

Mayo Clinic Patients: Ectopic Ureterocele and Ureters Age at Dx: Pre vs Post Maternal-Fetal US

Age at Presentation	1962-1977 Pre-US N=101 pt	1983-1998 Post –US N= 94 pts	Statistical Significance
Neonate (<28 days)	13% (14/101)	74% (70/94)	p < 0.001
≥ 28 – 1 year Infant	32% (32/101)	7% (7/94)	p < 0.001
>1 -≤ 14 years (pre pubertal)	40% (40/101)	14% (12/94)	p <0.001
>14 years (post pubertal)	15% (15/101)	5% (5/94)	p = 0.02

Mayo Clinic Patients: Ectopic Ureteroceleles and Ureters Presentation: Pre vs Post Maternal-Fetal US

Presentation	1962-1977 Pre-US N=101 pt	1983-1998 Post -US N= 94 pts	Statistical Significance
Abnormal Maternal-Fetal US	4% (4/101)	71% (67/94)	p <0.001
Febrile UTI	44% (44/101)	7% (7/94)	p <0.001
Urinary Incontinence	19% (19/101)	8% (8/94)	p = 0.037
Voiding Dysfunction Ureteroceleles	10% (10/101)	1% (1/94)	p = 0.007

Impact of Febrile UTI & Urosepsis Ectopic Ureteroceleles and Ureters

- Pre- US Era $\approx 45\%$ pts Febrile UTI
- Uro-sepsis 15% -1/3 with urosepsis
 - 10% Mortality
 - 15% Develop CP
 - 25% Require Special Education

In essence = 10% mortality, 40% morbidity

Levy, et al, Ped Inf Dis J 15:1996, D Jong et al, J of Urol 164: 2000,
van der Ree, et al, Early Human Dev 87:2011

Impact of Febrile UTI on Selection of Surgery

Partial Nx; all children with history of febrile UTI

- Function on DMSA upper pole
 - Poor $<15\%$
 - 35% (30/85 pt) chronic pyelonephritis
 - Good $\geq 15\%$
 - 14% (2/14 pt) chronic pyelonephritis
- Significant concern
 - Upper to lower pole anastomosis

Hypertension Multicystic & Segmental Dysplastic Kidney

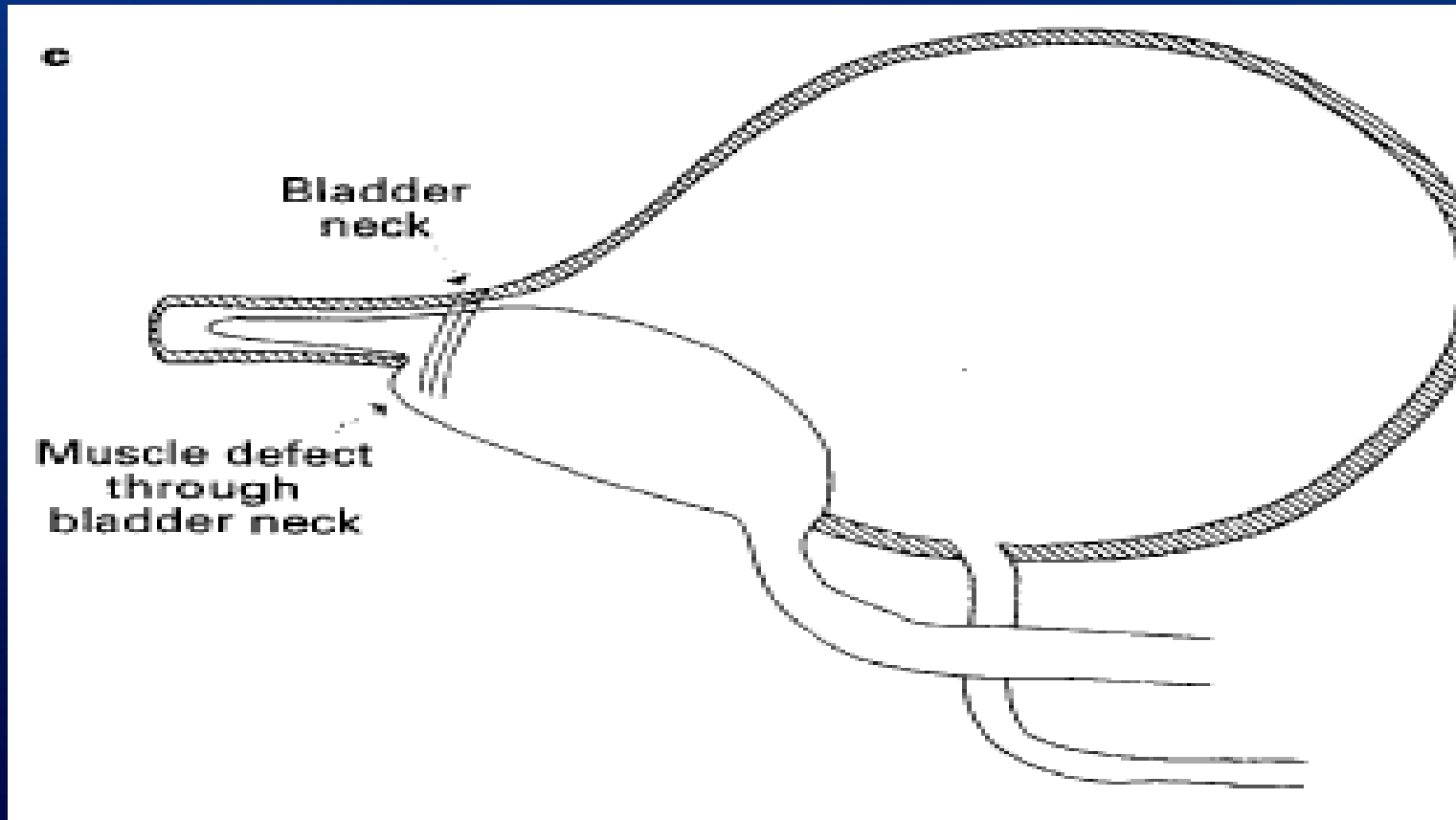
Incidence of hypertension

- 0.5-0.7%
- DMSA
 - Only reported in functional kidneys
- Nx or partial Nx resolves HPT in 1/3rd
 - Majority of HPT contralateral or lower pole scars

Levy et al J of Urol 158:1997, Narchi, Arch Dis Child 90:2005,
Gran et al J of Urol 173: 2005

Ectopic Ureterocele

Hypothesis of Intrinsic Deficiency of Bladder Neck



Sumfest et al BJU 75:1995, Hendren & Mitchell J of Urol 121: 1979

Hypothesis Regarding Long-Term Development of Urinary Incontinence Ectopic Ureterocele

- Congenital malformation of bladder neck
 - Paucity of internal sphincter musculature
 - Women > men 4:1
 - Age and Parturition status
 - High incidence SUI in adults

Hendren & Mitchell J of Urol 121: 1979

Three Strikes Its Out Ectopic Ureterocele - Ureter

- Infection
- Function < 10%
- Bladder neck involvement

Pre-Sono Era

- Surgery of choice – Complete Reconstruction
- Nonfunctional (<10%) upper moiety
 - Partial Nx, ipsilateral lower pole reimplant, excision of ureterocele, BNR +/- contralateral ureteral reimplant
- Function (>10%) upper moiety
 - U-U (upper or lower level), ipsilateral lower pole reimplantation, excision of ureterocele, BNR, +/- contralateral ureteral reimplant

Hendren & Mitchell J Urol 121: 1979,

Churchill et al, J Ped Surg 27:1992, Shekarriz, et al J Urol 162: 1999

Pre vs Post Sonographic Era

- Pre- Sono Era - N=101 pts (1962-1977)
 - Median age -18 months (range 1 day- 48 yrs)
- Post – Sono Era N=94 (1983-1998)
 - Median age – 3 months (range 1 day - 62 yrs)
 - $p < 0.05$

Brown et al. AM J Rad 148:1987, Husmann, Mayo- Unpublished data

Significant Concerns Raised

Infant surgery

- Increased technical difficulty
- Risk of renal loss
- Risk of impairment of bladder neck
 - Life long incontinence
 - Scared bladder neck – voiding dysfunction
- Risk of damage to contralateral vas or ejaculatory duct

Scherz, et al Urology 31:1988, Albers et al Urology 45:1995,
Husmann, et al J Urol 154, 1995

Post Sono Era

- No longer dealing with Dx following febrile UTI
 - Risk of chronic pyelonephritis - less
- Risk of Dysplasia-Hypertension
 - Low
- Does anyone really know the risk for SUI?
- Need to change to less risky operation

Scherz, et al Urology 31:1988, Husmann ,et al, J Urol162:1999,
Husmann, et al J of Urol 167,2002

Pathologic Key to Bladder Neck Dysfunction (Outlet) Causing Obstruction

Pathologic Alterations

- Over distension bladder wall = hypoxia
 - Apoptosis – **neural** & smooth muscle cells
- Reperfusion injury = Toxic oxygen radicals
 - Endothelial leak of fluid into interstitium
 - Damage DNA
 - Alters bladder collagen
 - Apoptosis - smooth muscle & interstitial cells
- **What does this mean to the urologist?**

Frimodt, Dan Med Bull 25:1978, Bratslavsky et al J of Urol 170,2003,
Madersbacher et al, Neuro & Urod 31:2012

Bladder Outlet Obstruction

What does the Urologist Need to Know?

- Hypoxia
 - **Kills sensory nerves first**
 - Lumbar-sacral ganglia second (contraction)
- Collagen alterations
 - Impairs smooth muscle syncytium (contraction)
- UDS alterations in order
 - **Impaired sensation**, overactive, overactive
poorly contractile, underactive

Abrahmsson, et al, J of Urol 160:1998,
Foon, et al, Int J Gynecol Obst 110:2010

In patient's with an ectopic ureterocele;

Is bladder neck dysfunction & primary bladder dysfunction a consequence of surgery or due to the underlying congenital anomaly?

Ureterocele Puncture, Partial Nx Alone, Complete Reconstruction

- Ureterocele Puncture N= 41 pts
 - Median surgery age - 5 days (1-2 weeks)
 - Median follow up 10 yrs (3-34 yrs)
- Partial Nx N=87 pts
 - Median surgery age - 3 months (1 month - 16 yrs)
 - Median follow up 10 yrs (3-28 yrs)
- Complete- Total Reconstruction N=60 pts
 - Median surgery age - 4.5 yrs (3 months – 16 yrs)
 - Median follow up 14 yrs (3-28 yrs)

Ureterocele Puncture, Partial Nx Alone, Complete Reconstruction

	Ureterocele Puncture/incision	Upper pole Nx	Total Reconstruction
Delayed Void ≤ 3 times per day	7% (3/41)	11% (10/87)	12% (7/60)
Urgency Incontinence	20% (8/41)	10% (9/87)	8% (5/60)
Need for CIC	2.5% (1/41)	2% (2/87)	3% (2/60)
Stress or total Incontinence	2.5%(1/41)	6% (5/87) 2 pts bilateral ureteroceles	3% (2/60)

Husmann, et al, J Urol 154, 1995, Husmann ,et al, J Urol 162:1999,
Husmann, et al J of Urol 167,2002, Holmes et al, J Urol, 168,2002

Is there a voiding abnormality present based on treatment used? Median F/U 10 – 14 yrs

- Urinary incontinence
 - 25-30% of pts irrespective of Rx
- Timed voiding +/- anticholinergics
 - 75-85% resolution
- CIC required
 - 7-12%
 - **Could we have prevented by better F/U?**

Persistent Stress or Total Incontinence 2-3% of Ectopic Ureterocele Patients (Median F/U 15 yrs, Range 8-28)

8 pt - BNR with sling

4 pt - success

2 pt - AUS

2 pt - BNL & Stoma

Failed 15, 22 yrs

2 pt - BNL & Stoma

Ureterocele; What to do with persistent VUR? Females Only

- 29% (54/188 pts) No Reflux
- 49% (93/188 pts) high grade 4-5 reflux
 - We repaired -163 ureters
 - 75% success (122/163 ureters)
 - 41 ureters treated with Deflux
 - 63% (26/41) success
 - 15 ureters
 - 5% (8/188) with U-U
 - 4 % (7/188) persistent VUR

Persistent Low Grade VUR (2-3/5)

- 22% (41/188) pts
 - Median F/U 13 yrs (2-28 yrs)
- 76% (31/41 pts) asymptomatic
- 10 pts (18 ureters) recurrent > 2 UTI – catheterized
 - 80% (8/10 pts) successfully Rx with Deflux
 - 20% (2/10 pt) Failed Deflux UNO with success
- Persistent observation - low grade VUR reasonable

Ureteral Stump Syndrome

Ectopic Ureters

- All ectopic ureters into the urethra managed by **open partial nephrectomy**
- Repeat VCUG performed 3 months post op
- **Refluxing stumps** ligated **distal to iliac vessels**
 - 20 pts
 - 50% (10/20) with resolution of reflux
- **Non-refluxing stumps** left to **drain**
 - 21 pts
 - 29% (6/21) new onset of VUR

De Caluwe, et al, J Urol 168:2002

Ureteral Stump Syndrome

41 pts - Median F/U 15 yrs (3-28 yrs)

Non-refluxing stumps 21pts

- Never Refluxed – 15 pts
 - 13% (2/15) Recurrent UTI
 - 87% (13/15) Asymptomatic
- Secondary Reflux – 6 pts
 - 50% (3/6) Recurrent UTI
 - 50% (3/6) Asymptomatic

Refluxing 20 pts

- Always Refluxed – 10 pts
 - 30%(3/10) Recurrent UTI
 - 70% (7/10) Asymptomatic
- Initially Refluxed – 10 pts
 - 30% (3/10) Recurrent UTI
 - 70% (7/10) Asymptomatic

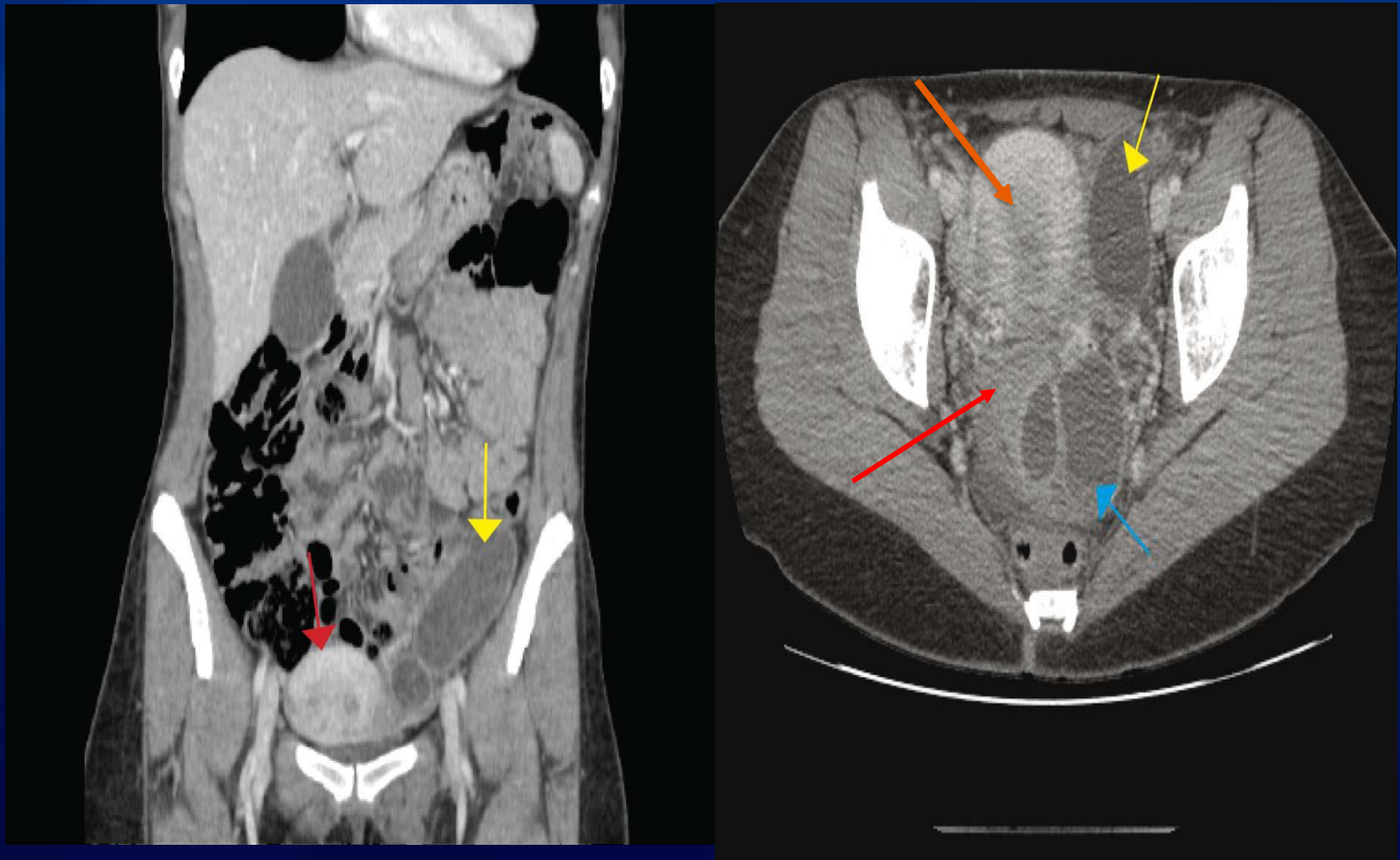
Never Refluxed 13% (2/15) Recurrent UTI
Refluxed 35% (9/26) Recurrent UTI

Ectopic Ureters Presenting As Adults (N=14 women)

- Presented with classic voiding history of voiding normally yet wet all of the time since childhood (28%; 4/14)
- Presented with **recurrent UTI's, incontinent only during pregnancy** (28%;4/14)
 - Ectopic just distal to BN
 - Gravid uterus extra pressure
 - Laxity of pelvic floor induced by hormones

Blacklock, et al, BJU54:1982, Eubanks & Gonzalez, Ob & GYN 127:2016

Dysplastic Kidney with Ectopic Ureter DX as a Vaginal Cyst

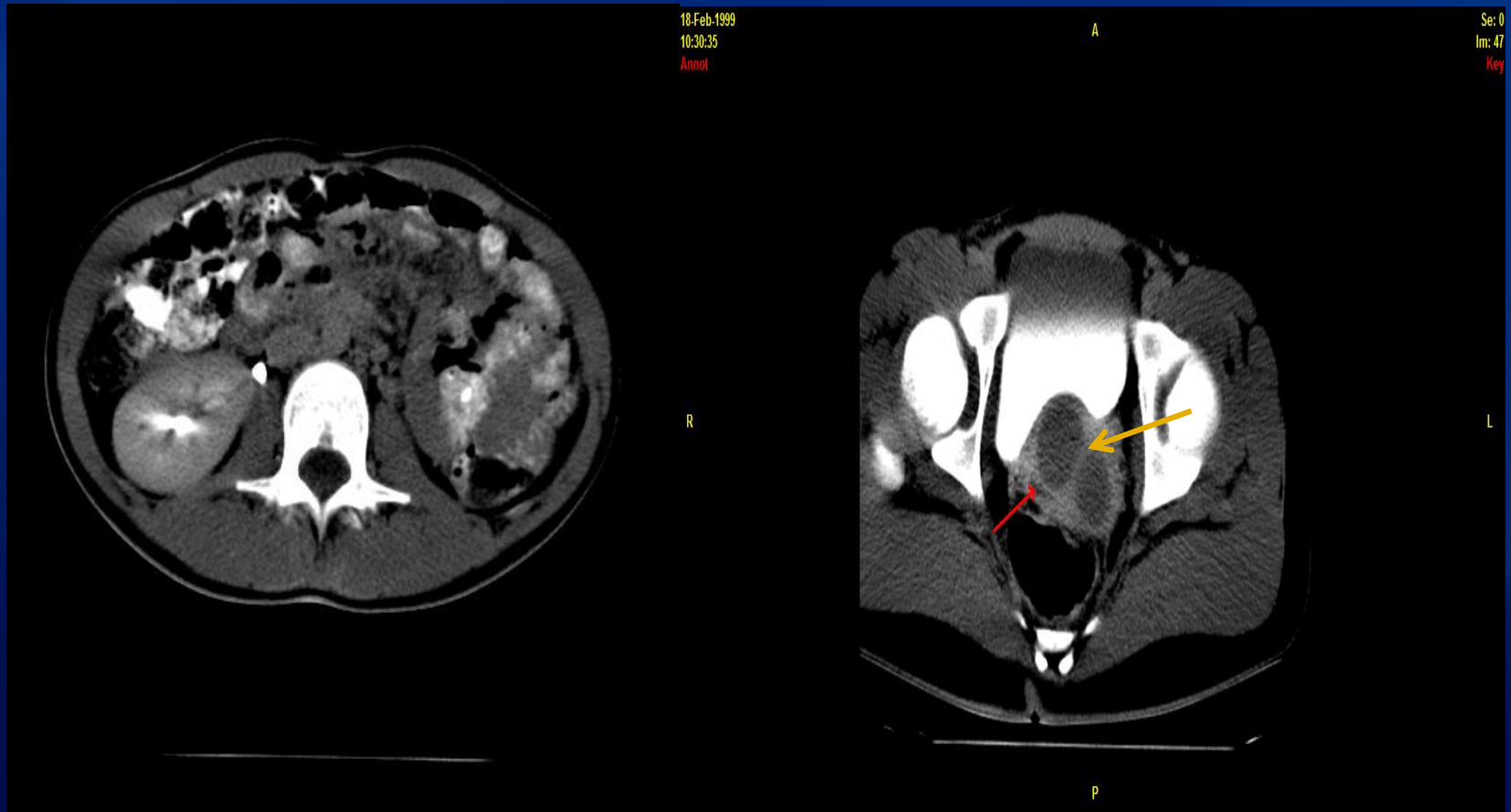


Ectopic Ureters Presenting As Adults (N=14 women)

- Incontinent following excision of “vaginal cyst” by GYN 28% 4/14 pts
 - Terminal segment of ectopic ureter occluded forming vaginal cyst

Eubanks & Gonzalez, Ob & GYN 127:2016

21 y/o woman with severe dysmenorrhea

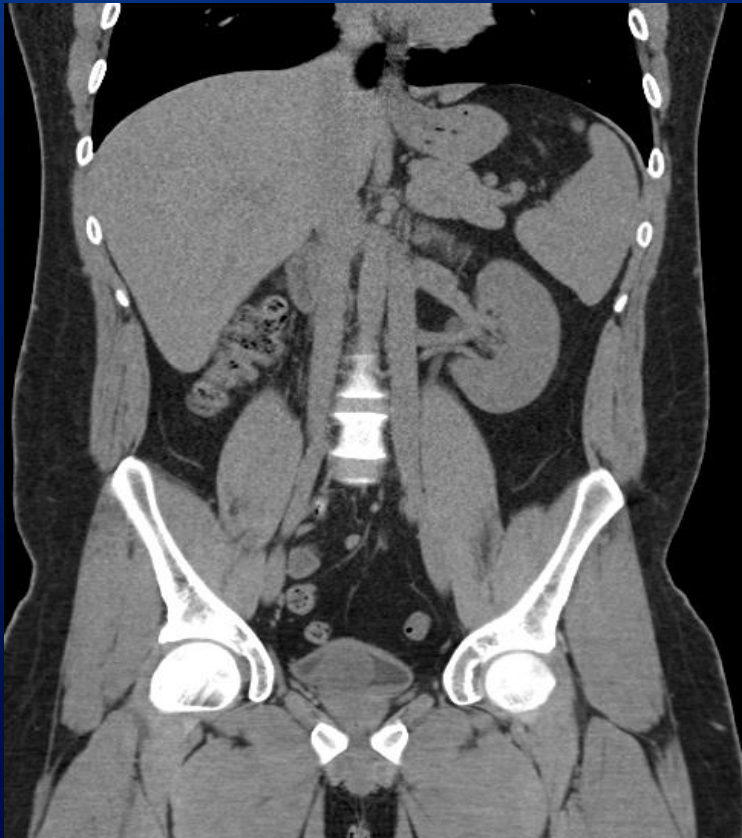


Vaginal Duplication and Ectopic Ureters Obstructed Hemi-vagina and Unilateral Renal Agenesis

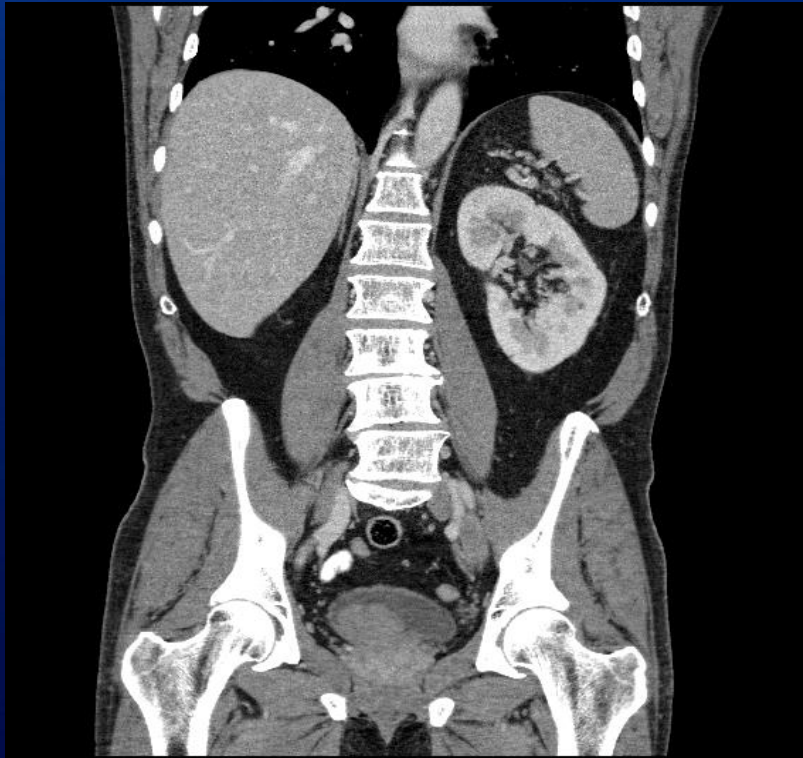
- Presentation classically with severe dysmenorrhea secondary to obstructed hemivagina
- MRI/CT with vaginal duplication and obstruction with uterine didelphys – agenesis/dysplastic kidney
- GYN – Resected vertical vaginal septum
- Onset of classic hx urinary incontinence yet voiding normally - post resection (16%; 2/14)

Bolonduro, et al, J Min Inv Gyn Surg 22:2015

50 y/o man with intermittent left flank pain, CT stone protocol



28 y/old male with pain with ejaculation, cystic right pelvic mass on rectal US



Zinner's Syndrome

- Ectopic Ureters in men 55% empty into prostatic urethra with paucity of symptoms
- Zinner's Syndrome
 - 45% - empty into seminal vesicle, ejaculatory duct or proximal vas
 - Unilateral renal agenesis on Fetal US
 - Unilateral laterally displaced mesonephric duct cyst develops post puberty
 - Secretions from seminal vesical ducts

Mogg, S African Med J, 1967, Carbone et al, Eur Urol, 52, 2007,
Allaparthi & Blute Cn J of Urol 17: 2010

Zinner's Syndrome

- At puberty or in adulthood- Recurrent prostatitis, epididymitis, pelvic pain, infertility, palpable prostate anomaly
 - 2 pts > 60 yrs of age - underwent transrectal prostate biopsy “**abnormal prostate on DRE**” pelvic abscess requiring PCN drainage and delayed surgery

Zinner's Syndrome (Beware of Voiding Dysfunction)

- 5 pts referred with obstructive voiding Sx
 - First pt -excised mesonephric cyst
 - Continued voiding dysfunction
 - UDS- underactive bladder on CIC
- The remaining - 4 pts UDS first
 - All with UDS with underactive bladder
 - 2 excised on CIC
 - 2 excised voiding with Valsalva with high PVR observing
 - **Should we have operated?**

Chronic Pyelonephritis following U-U

- 3 pts with history of recurrent febrile UTI (2-4)
 - Ureteral ectopy into urethra – no reflux
 - Upper to lower UU, transection of stump
- Multiple recurrent UTI in adolescence & adults
 - No voiding dysfunction, refluxing stump, VUR
 - **Bacterial Isolation studies - ipsilateral bacteria**
 - DMSA scan 20-25% function as adult
- Nephrectomy - chronic pyelonephritis both segments

Points to Remember

- Voiding dysfunction post Ureterocele Rx appears to be primary in origin **not surgically induced**
 - Timed Voiding – Key
- Persistent **incontinence with ureterocele primary defect**, rare but does exist
 - ≠ AUS
- Reimplantation high grade VUR post ureterocele
 - 75% success
 - Salvage 50% failures with Deflux

Points to Remember

- Grade 1-3 VUR - post ureterocele Rx
 - Successfully managed observation in 75%
- Ureteral stump syndrome
 - Refluxing stump 1/3rd require surgery
 - Non-refluxing stump 15%
- Ectopic Ureters in adult women
 - Classic voiding history may be delayed
 - Beware of incontinence -I&D Vaginal cyst

Points to Remember

- Zinners Syndrome
 - Voiding dysfunction maybe due to underactive bladder – not cyst
- Beware of risk of **chronic pyelonephritis with UU** in patients with **history of recurrent UTI**

Thank- You