Servicio Canario de la Salud
HOSPITAL UNIVERSITARIO DE CANARIAS

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ICS Lecture

Urethral obstruction in women: diagnosis and management

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MIPS
Mediterranean Incontinence and Pelvic Floor Society

ICS

Bladder outlet obstruction in women

Anatomic

- Iatrogenic
  Stricture
  Anti-incontinence surgery
- Pelvic organ prolapse
- Extrinsic compression
- Gynaecologic tumours
- Meatal stenosis
- Caruncle
- Skene's gland abscess
- Urethral diverticulum
- Urethral carcinoma
- Ectopic ureterocele
- Retroverted impacted uterus (first trimester)

Functional

- Primary bladder neck obstruction
- Dysfunctional voiding
- Detrusor external sphincter dyssynergia

Bladder dysfunction

-Detrusor underactivity

Neuropathic

- Lower motor neurons
- Decentralizations

\- Myogenic

- Chronic obstruction or overdistention
- Diabetes mellitus

Pharmacologic

- Anticholinergics
- α-agonists
- Narcotics

Aging

-Acontractile bladder

- Failure of sphincteric relaxation
- Fowler's syndrome

Female Urinary Retention/ Bladder Emptying Disorders

- Complete retention
- Incomplete or insufficient emptying
- Elevated postvoid residual (PVR)
- Symptomatic or asymptomatic
- Acute or chronic

Evaluation

- History
- Physical examination
- Cystoscopy
- Urodynamics
- EMG
- Imaging studies

History

- No validated outcome measures
- Overlapping of symptoms of Anatomic obstruction, DV & PBNO
- DV more likely to express storage symptoms whereas women with PBNO have voiding (Brucker & Nitti 2012)
- Timing of the onset of symptoms
- Past medical and surgical history
- Sexual & defecatory dysfunction associate
- Complete or partial retention, change over time
- Surgical & other risk factors; technical, haematoma
- Persistent incontinence

A Voiding Diary will provide information of paramount importance

Physical examination

- Causes of anatomic obstruction (POP, urethral diverticulum..)
- Tenderness in levator muscle complex
- Abdominal examination (constipation)
- Rectal examination (faecal impactation)
- Bimanual examination- Bladder palpation
- Neurologic examination
- Occult dysraphism
- PVR

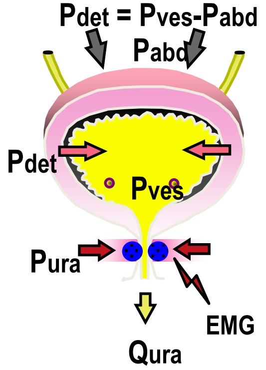
Urodynamics and BOO in women

2 or more of
- -Q max<12 ml/sec
- -Pdet@Qmax >50 cm H_2O
- -Urethral resistance (Ped@Qmax/Qmax^2) > 0.2

+

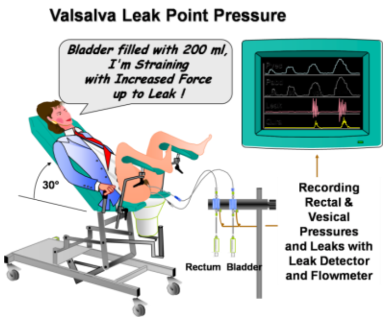
"Significant " postvoid residual volume

Massey & Abrams 1988



Qmax <15ml/sec + Pdet@Qmax >20 cm H2O
Sensitivity = 74.3% Specificity = 91.1% for detecting BOO
Chassagne 1998

Q max =12 ml/sec (2-34) & median Pedt@Qmax =37 (10-116)



Blaivas & Groutz nomogram for BOO
4 categories from no obstruction to severe obstruction
Poor correlation with symptom score index

Nitti 1999 !Pressure-flow studies alone may fail to diagnose female BOO!

Urodynamics

Gold standard to identify the cause of DV or PBNO

Videourodynamics is useful to identify level of obstruction

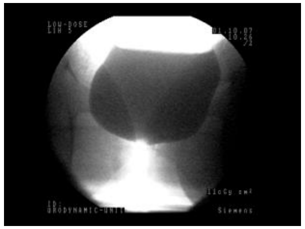
- PBNO= Obstruction is localized at the bladder neck
- DV= Obstruction is localized at the external sphincter
- Spasmodic activity of the sphincter

Needle EMG

14% of women with PBNO express increased EMG activity

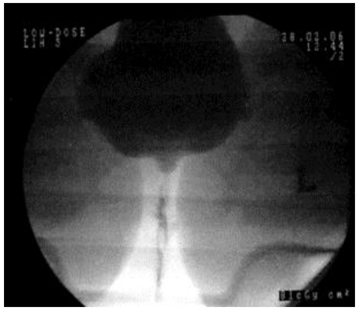
High pressure / Low flow

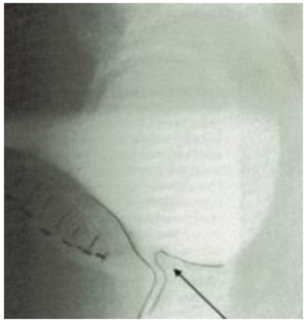
High detrusor pressure / Low Flow typical urodynamic finding



Postoperative voiding dysfunction (PVD)

- Precise definition of short/long-term problems not defined
- Short-term retention = 0 % to 27 %, long-term= 0 % to 3.8 %. *(Petri 2005)*
- Tape too tight or bad contractility
- Cochrane Data base TVT 5.9% TOT 2.8% *(Ogah J 2009)*
- Swann sign at MCU; curve at bladder neck
- Prolonged voiding with low Qmax<15 cm H2O & Pdet (>25 cm H2O) & PVR
- OAB complaints





Urethral stricture in women

3-8 % of women who present to urologist with voiding complaints have BOO (Carr 1996)

The incidence of urethral stricture in women with BOO varies from 4% to 13% (Nitti 1999, Groutz 2000, Kuo 2005)

Female urethral stricture is tyiucally iatrogenic

Etiology of urethral stricture in women

Rare entity
Controversial etiology
Likely that most cases are iatrogenic or traumatic in nature

Prolonged catheterization
Pelvic radiation
Childbirth
Pelvic fracture
Surgery for diverticulum, fistula or incontinence
Urethral dilatation (periurethral fibrosis)

Small series & case reports
Tuberculosis, vulvar dystrophy, lichen sclerosis, primary carcinoma, fibroepithelial
Polyps, urethral leiomyoma, bladder drained pancreatic transplants, post TURBT
Resection of sacrococcygeal teratoma & after female-to-male transsexual reconstruction

Urethral stricture in women
Diagnosis

Symptoms

Frequency & urgency, dysuria, hesitancy, dribbling, incontinence and recurrent UTI (Migliari 2006)

Urinary retention (Merimsky 1985)

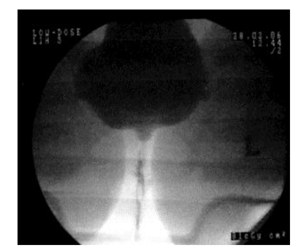
Renal failure, hydronephrosis & pyelonephritis (Romero 1995)

Stricture should be suspected if there is difficulty instrumenting the patient

Physical examination

Urethral calibration

Meatal stricture



Voiding cystourethrogram (VCUG)

Urethroscopy

Urodynamics

Urethral stricture in women

Treatment strategies:
Role of urethral dilatation and Urethrotomy

There is no evidence suggesting any role on the treatment of urethral stricture

Dilatation can result in bleeding, urinary extravasation and SUI

However urethral dilatation continues to be a common practice

Female Urethral Dilatation for LUTS

Lyon & Smith 1963 : LUTS in girls were due to distal urethral stenosis

Empiric treatment of women and young girls with dysfunctional voiding &recurrent UTI

Today: Pelvic Floor Dysfunction

However 21% of urologists trained more than 12 years ago consider it very succesful (Lemack 1999)

Avoid urethral dilatation

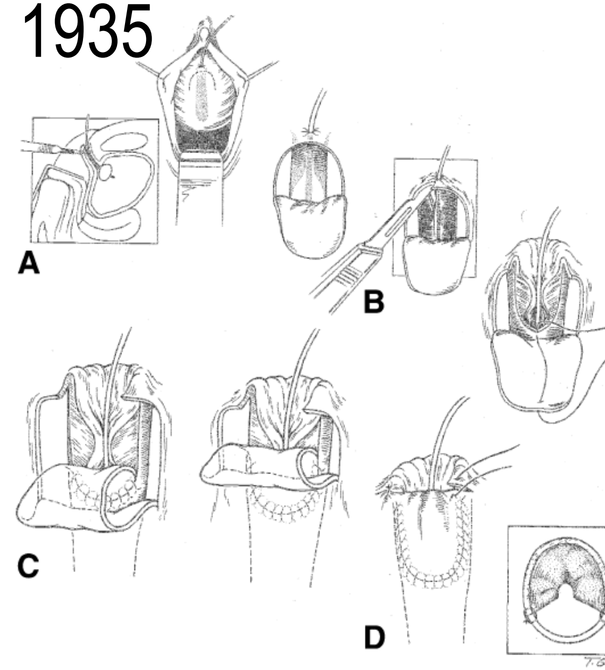
Surgical Options – Vaginal Flap

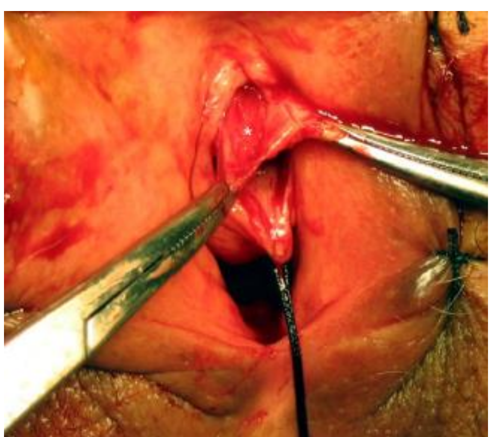
Vaginal Flap urethroplasty first described in 1935

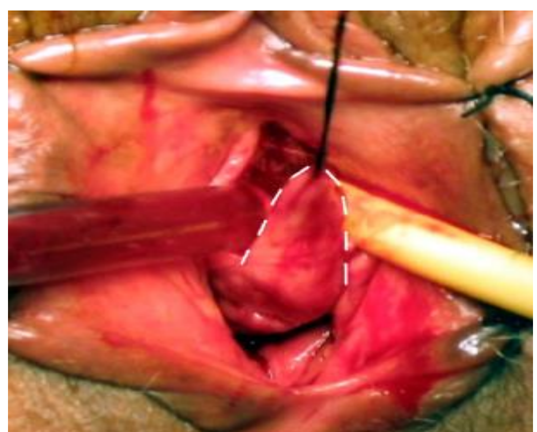
Harris Surg Gynes Obstet 1935 61: 366

Modified Ellis and Hodges J Urol 1969 102:214

- Urethral catheterisation
  - ‘U’ flap in anterior vaginal wall
  - Stricture incised
  - Flap advanced avoids tunneling







Neurourology and Urodynamics 29:S42–S45 (2010)

REVIEW ARTICLE

Vaginal Flap Urethroplasty for Female Urethral Stricture Disease

E. Ann Gormley*
Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire

TABLE I. Preoperative Patient Characteristics

Pt no.	Symptoms	Prior treatments	Incontinence (type)	PVR	Catheterizable in office	Urethral caliber (Fr)[a]
1	Urge/frequency	Dilation, urethrotomy	Yes (urge)	240	No	4
2	Urge/frequency, renal failure	Dilation, urethrotomy	No	500	No	8
3	Urge/frequency	Dilation, excision of urethral polyp	No	10	Yes	10
4	Urge/frequency	Dilation, excision of urethral polyp	Yes (stress)	10	Yes	10
5	Urge/frequency, infections	Dilation	No	Min	No	8
6	Urge/frequency	Dilation	Yes (stress)	10	Yes	12
7	Urge/frequency	Dilation	No	NR	No	10
8	Urge/frequency	Dilation	Yes (stress)	NR	Yes, difficult	12
9[b]	Urge/frequency, retention	Young/Dees/Leadbetter procedure	No	310	Yes, difficult	12
10[b]	Urge/frequency	Dilation, hx of pelvic RT	Yes (urge)	50	Yes	12
11[b]	Urge/frequency	Dilation	No	Min	No	10
12[b]	Urge/frequency, retention	Dilation, urethrotomy	No	220	Yes, difficult	16 RR

RR, red rubber catheter.
SUI was confirmed in three patients with urodynamics. When a UDS catheter could not be placed the type of incontinence was determined by history.
[a]Measured in the office if a catheter could be placed but otherwise measured in the operating room.
[b]Additional patients.

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TABLE II. Postoperative Patient Characteristics

Pt no.	Infections	Incontinence (type)	PVR (cm^3)	Urethral caliber (Fr)[a]	Further therapy needed	Follow-up (months)
1	No	Yes (urge)	20	14	Yes[c]	46
2	No	No	10	18	No	12
3	No	No	Min	14	No	22
4	Yes[a]	No	75	18	No	113
5	No	Yes (urge)	NR	14	No	18
6	No	Yes (stress)	NR	21	No	24
7	Yes[a]	No	220	14	Yes[d]	59[e]
8	No	Yes (stress)	NR	18	No	12
9[b]	No	No	NR	22	No	36
10[b]	No	Yes (urge)	NR	22	No	15
11[b]	No	No	Nil	17	No	3
12[b]	No	No	Nil	22	No	4

Patients 4 and 8 had a pubovaginal sling placed at urethroplasty and patient 6 underwent bladder neck collagen injections.
[a]Recurrent UTI's approx. 9- and 4-year posturethroplasty both resolved with regular catheterization.
[b]Additional patients.
[c]Repeat dilation 3 weeks after urethroplasty.
[d]Cysto in the OR 58 months after urethroplasty.
[e]Additional follow-up.

Surgical Options – Other options

- Labia Minora - 2 patients
  - Tanello et al Urol in 2002
- Vestibular flap - 17 patients
- Montorsi et al Urol Int 2002
- Vaginal Mucosa
- Oral Mucosa
- Tsivian A and Sidi AA: Dorsal graft urethroplasty for female urethral stricture. J Urol 2006; **176:**611**.**
  - Ventral and Dorsal approaches

Female urethral strictures: successful management with long-term clean intermittent catheterization after urethral dilatation

© 2006 BJU INTERNATIONAL | 98, 96–99 | doi:10.1111/j.1464-410X.2006.06206.x

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TABLE 1 The patients' characteristics

Patient age, years	Presenting symptoms	Pertinent history	Number of dilatations	AUA symptom score before	AUA symptom score after dilatation	Q_{max}, mL/s	$P_{det}Q_{max}$, cmH_2O	PVR, mL	Months since last dilatation
22	Frequency, urgency, nocturia	Catheterization as a child	2	33	20	9.6	91	14	34
41	Hesitancy, straining incomplete emptying	Catheterization in pregnancy	1	11	9	6.9	103	29	6
50	Dribbling, frequency	Previous cystoscopy	4	18	9	8.7	25	428	28
36	Urgency, incomplete emptying	Previous cystoscopy	3	32	23	9.2	76	20	18
30	Nocturia, hesitancy straining	Catheterization in pregnancy	1	21	7	N/A	N/A	164	34
67	Incomplete emptying	Previous cystoscopy	1	24	7	N/A	N/A	167	20
43	Urgency, frequency, decreased force of stream	Catheterization and urethral calibration	1	25	14	14.2	85	10	8

Q_{max}, maximum urinary flow rate; $P_{det}Q_{max}$, detrusor pressure at maximum flow; PVR, postvoid residual urine volume; N/A, not available.

CONCLUSION

Urethral stricture is rare in women. Long-term CISC in these women is safe and effective, and can avoid the need for major reconstructive surgery.

Female Urethroplasty

Different principles from men
Excision and reanastomosis is substantially more morbid and may risk SUI
Dorsal approach imply very high morbidity
Ventral approach preffered by most of surgeons

Meatotomy

May be effective for short meatal strictures unlikely to involve voluntary sphincter incision of the ventral aspect into the healthy urethra followed by transversal suture using Heineke-Mikulics fashion

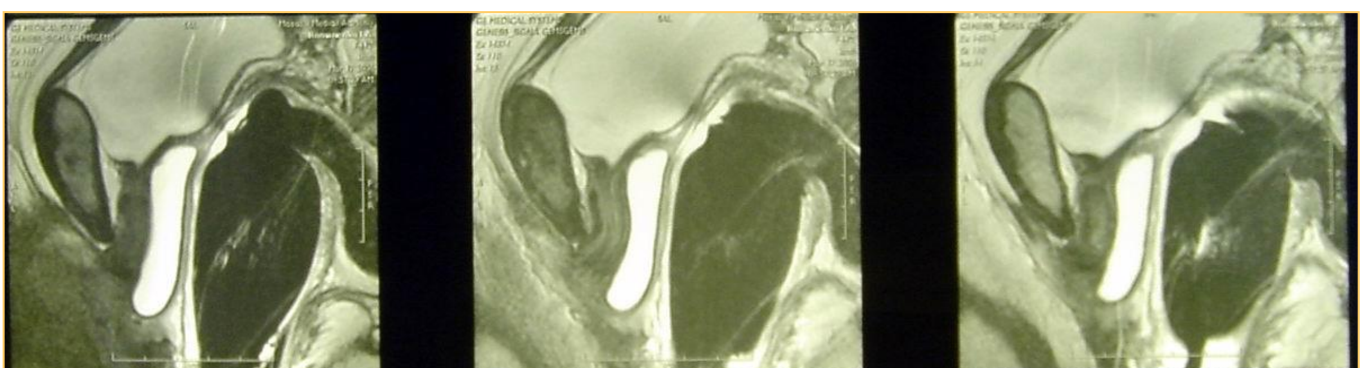
Resolution of recurrent UTI 1 year after meatotomy (Heising 1978)
Patients should be warned of the possibility of spraying with voiding

Technique	Study	n Pts	Benefits	Risks
Dilatation	Tekeo 1992 72006 NGUGI 200	17 7 49	Minimally invasive Office based	No objective measures;can worsen fribrosis, high recurrence rata
Urethrotomy	Massey&Abrams 1988	163	Minimally invasive Office based	No objective measures of efficacy
Meatotomy	Heising&Seifirth 1978	50	Little risk of incontinence	Possible spraying with voiding
Vaginal inlay flap	Schwender 2006	8	Durability, low morbidity,minimal risk of incontinence	Low risk of recurrent stenosis, persistence of irritative symptoms
Labia minora pedicle flap	Tamello 2002	2	Low morbidity	Inadequate experience to define efficacy
Dorsal vestibular flap	Montorsi 2002	17	Objective improvement in voiding	Risk of bleeding, inconyinence
Free labia minora skin flap	Rehder 2006	8	Improved voiding, continence	Risk of recurrence stricture
Ventral buccal graft	Berglund 2006	2	Useful for extensive strictures	Risk of meatal stenosis
Dorsal buccal graft	Migliari 2006	3	Improvement on urodynamics	Persistance of irritative symptoms
Dorsal buccal graft	Sharma 2009	15	Normal uroflows	Risk of submeatal stenosis

Urethral Diverticula

Periurethral mass

Etiology – unknown
Median age 40yrs (3^{rd} – 6^{th} decades)
No racial predilection
1.4% with SUI have a urethral diverticula
Diagnosis – mainly vaginal exam
Ultrasound + MRI
Type of repair
Functional results1-6% of adult females



Presenting Features of Diverticula

- Frequency/ Dysuria (56%)
- Recurrent infection (40%)
- Tender Mass (35%)
- Stress incontinence (32%)
- Post micturition Dribble (27%)
- Dyspareunia (16%)
- Stones (1-10%)
- Discharge of pus per urethram (12%)
- Retention (4%)
- Malignancy (rare – adenoca 80%)

Should always be suspected in the presence of recurrent unexplained lower urinary tract symptoms!

Physical findings:

- Periurethral mass
- Pus expressed at the meatus on compressing the urethra

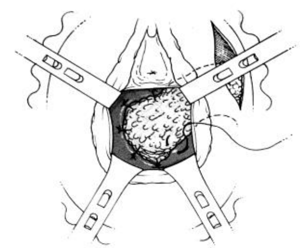
K Ganabarthi J Urol 152 1994 1445-1452

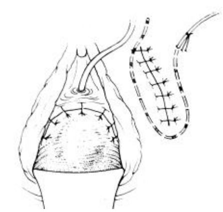
Female urethral diverticula
Treatment

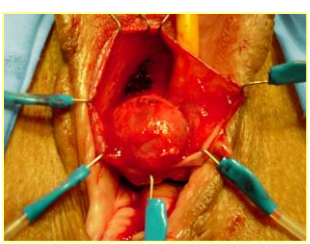
- Palliative
  - Endoscopic incision
- Curative
  - Marsupialisation
  - Excision
  - Excision &Young – Dees reconstruction

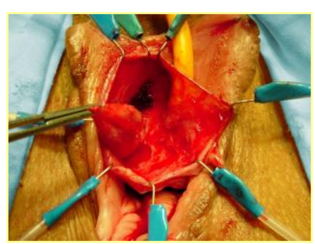
Technique

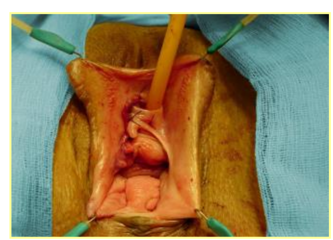
- ‘U’ Flap of vaginal mucosa
- Dissection of the diverticulum
- Closure in layers – careful repair of the urethra
- Martius flap
  - Overclosure of repair
  - Mitigate against stress incontinence
  - Facilitate subsequent sling procedure











Background of Primary Bladder Neck Obstruction

First described by Marion in 1933
Turner-Warwick advocated Urodynamics and VCUG
Diokno described the entity in 1984
Precise cause remains obscure
- Failure of dissolution of mesenchymal tissue at BN
- Inclusion of abnormal connective tissue
- Smooth muscle hypertrophy & inflammatory changes (Leadbetter 1959)
- Neurologic aetiology (Awad 1976)

Dysfunctional Voiding

- True Incidence not known 4.2% and 46.4% (Sinha 2011)
- 2% of Urodynamic investigations (Groutz 2001)
- Sometimes with DOA, low compliance or V-U reflux (Jorgersen 1982)

Exact mechanism not fully understood

In children is considered a habitual disorder learning to contract pelvic floor or external sphincter during micturition (Sinha 2011)

-Toilet training process

-Response to urgency

-Associated to pelvic discomfort (constipation, abuse)

Occult neurogenic disorder

It is possible that some women with DV were once children with DV

Abnormal electromyographic activity of the urethral sphincter, voiding dysfunction, and polycystic ovaries: A new syndrome?

Clare J Fowler, Timothy J Christmas, Christopher R Chapple, Helen Fitzmaurice Parkhouse, Roger S Kirby, Howard S Jacobs

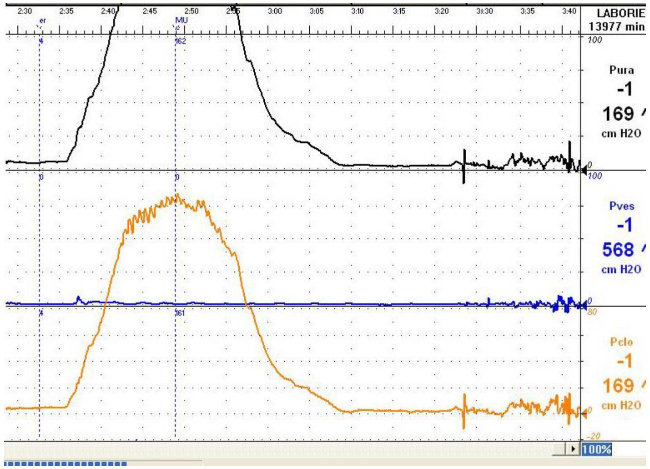
BMJ VOLUME 297 3 DECEMBER 1988

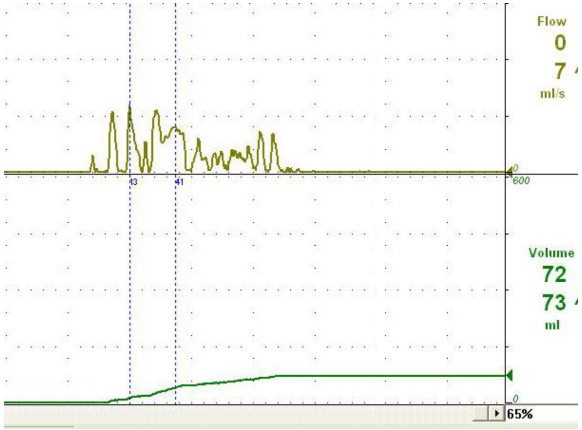
Fowler's syndrome

- Young women
  - post menarche
  - Polycystic ovary 40%
- High volume painless retention
- Apparently unconnected precipitating event
- All investigations normal, including MRI
- Not taking drugs, particularly opiate

Diagnosis

- History
  - Painless retention >1L on at least 1 occasion
  - Problems with ISC- especially on withdrawal
- Raised maximum urethral closure pressure/ sphincter volume *(Wiseman et al. J Urol 2002)*
- Characteristic sphincter (not PF) EMG
- May be due to ephaptic transmission in the skeletal muscle

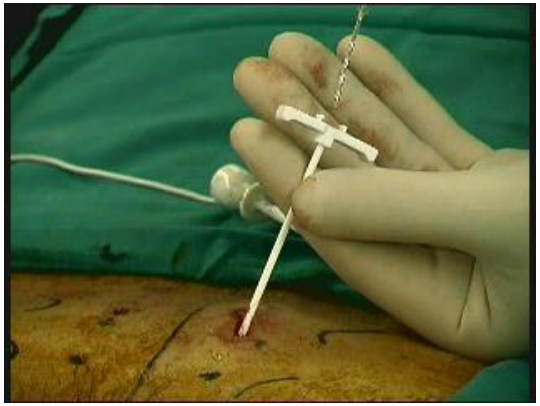


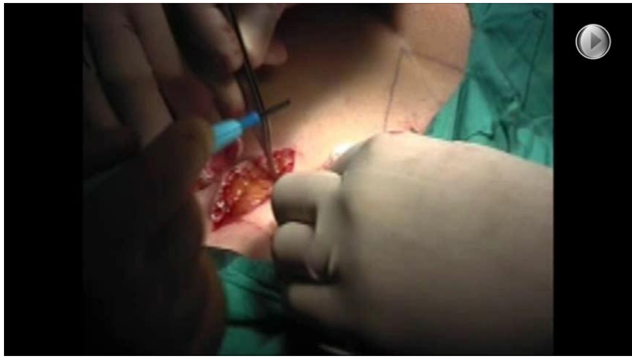


Treatment of Fowler's syndrome & Dysfunctional Voiding

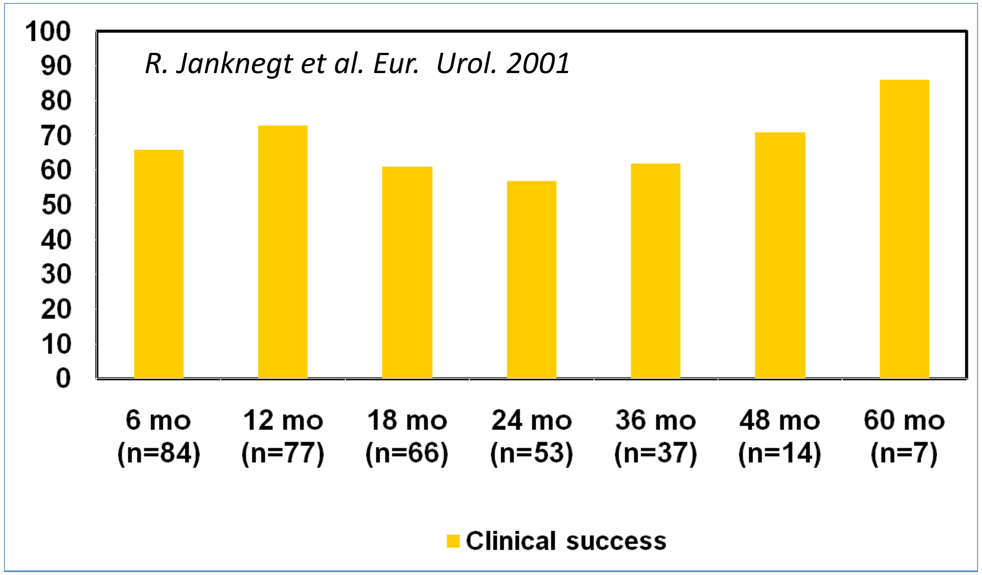
- Stop all opioid analgesic drugs
- No established drug treatment
  - Alpha-1 antagonists and PDE5 inhibitor poor outcome
  - PDE4 inhibitor theoretical potential
- Self catheterisation very poorly tolerated

  Mitrofanoff procedure?
- Sacral nerve stimulation

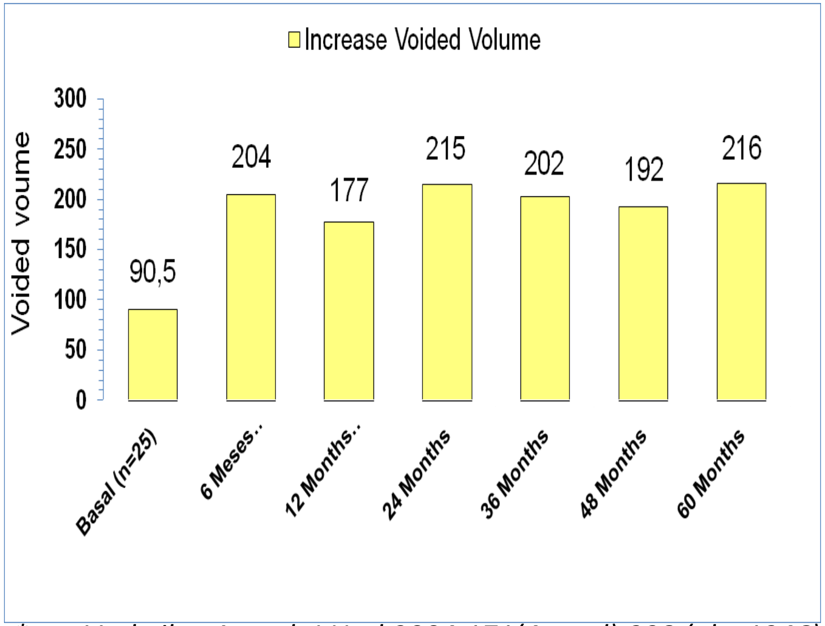




Urge Incontinence
% improvement on
Incontinence episodes / day

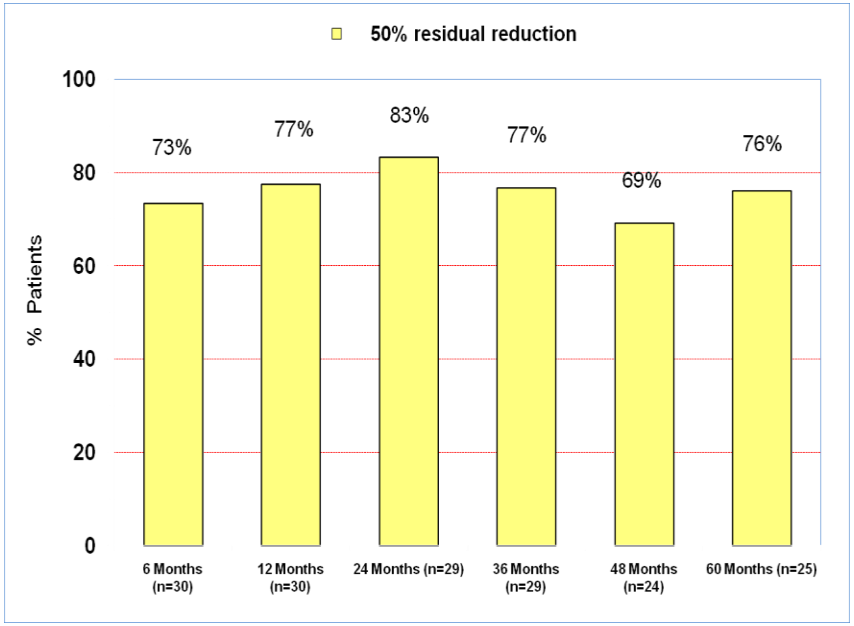


Urgency-Frequency
Maintained Clinical Efficacy



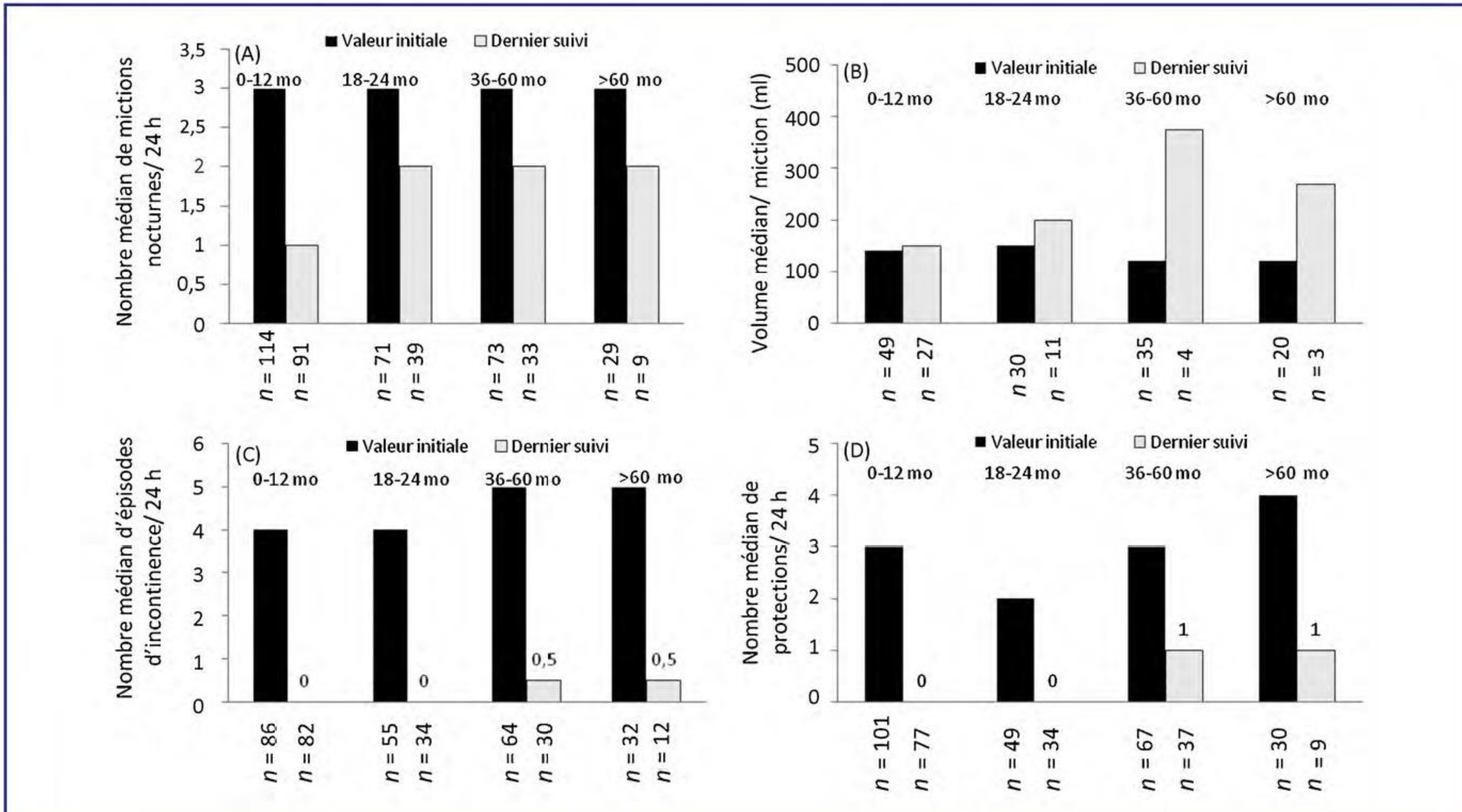
*van Voskuilen A et al. J Urol 2004;171(4suppl):328 (abs.1246)

Urinary Retention
Mantained Clinical Efficacy



*van Voskuilen A et al. J Urol 2004;171(4suppl):328 (abs.1246)

73% – 85% efficacy for OAB
75% – 89% efficacy for UR



Chartier-Kastler et al., Results from the French national register; Prog urol 2011

Summary

- Urethral obstruction in women results from various aetiologies
- Pelvic floor dysfunction and primary bladder outlet obstruction are common causes
- Accurate diagnosis is paramount
- Urodynamic testing with fluoroscopy = Gold standard
- Treatment is step up process from conservative to surgical therapy
- Neuromodulation is the choice for Fowler´s syndrome
- TUI is preserved for severe, decompensated PBNO
- Urehtral dilatation should be avoided

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45th Annual Meeting

5th - 9th October

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