

NHS
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Ketamine Uropathy

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Consultant Urologist with subspecialist interest in Female, Functional, Reconstructive and Neuro-urology

MidYorks NHS Trust/Barnsley NHS Foundation Trust

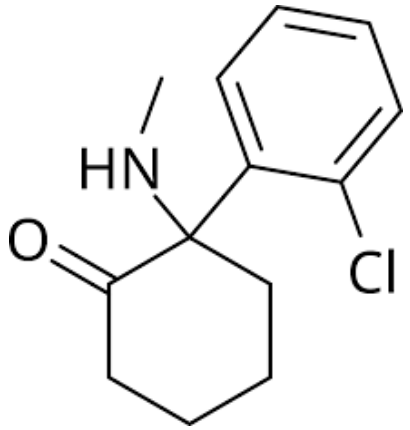


NHS
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What is Ketamine?



- Non-competitive NMDA acid receptor complex antagonist
- Used in the induction and maintanence of anaesthetic, refractory status epilepticus, acute and chronic pain and an antidepressant
- Metabolised in the liver by cytochrome P450 to active metabolite nor-ketamine
- Un-metabolised ketamine and norketamine are **water soluble and excreted primarily in the urine**
- Multiple administrative routes
- Onset 3-5 mins, lasts 1hr



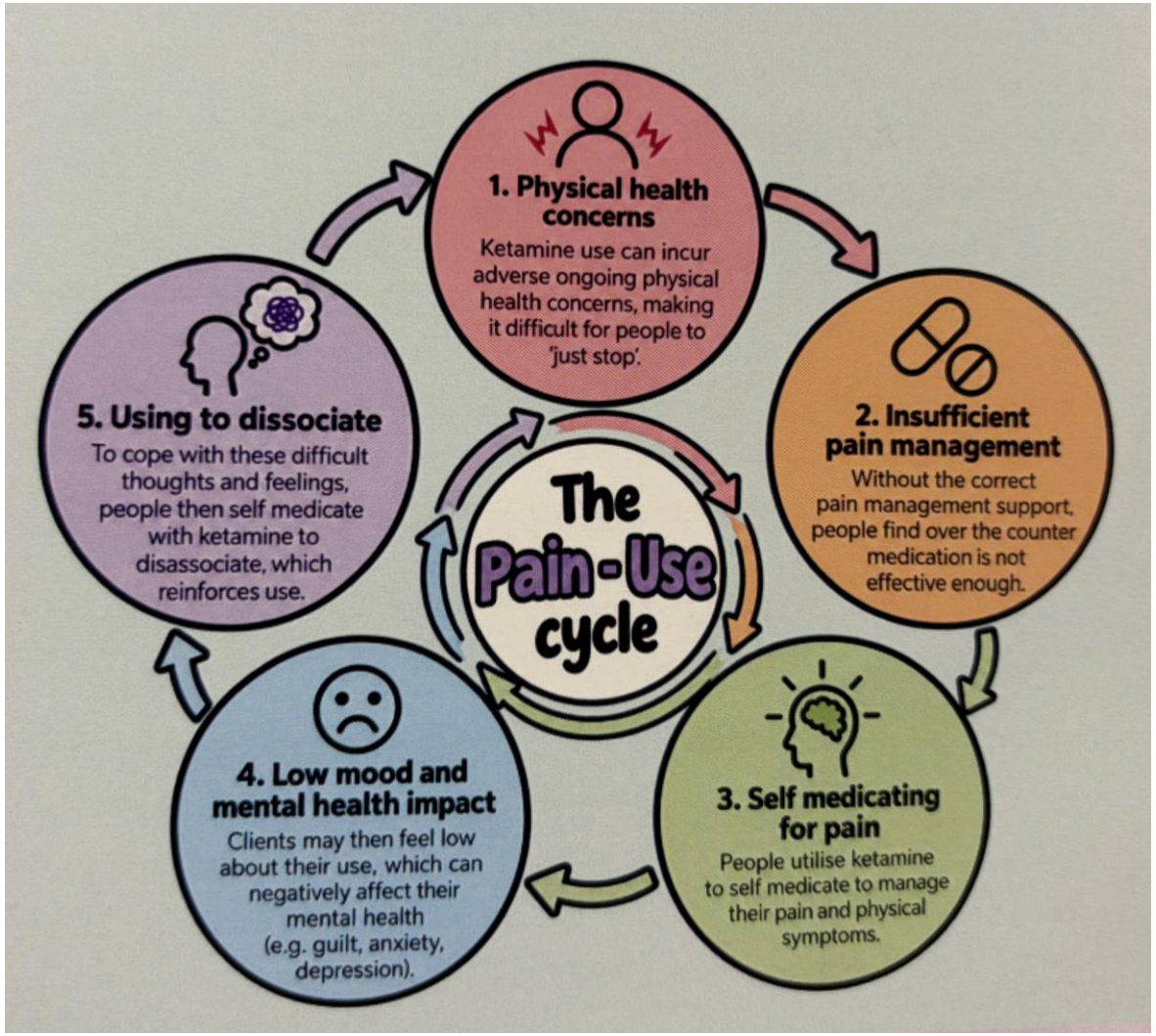
Illicit Use

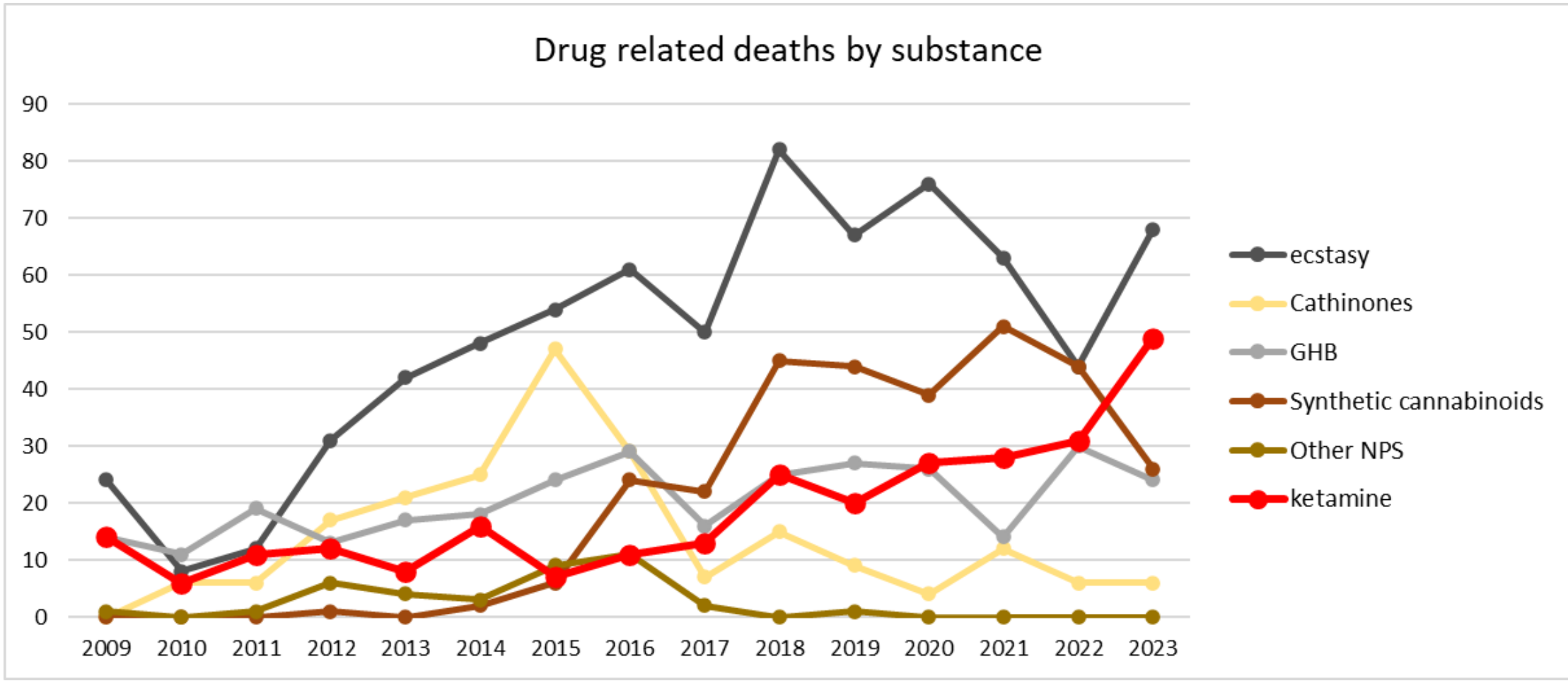
- 1990's became a popular "rave" culture drug
- Reported age of first use in the population is around 16
- 3% of 16-24 year olds are using ketamine
- Physiological dependence develops in 78.9% of users after 1 year
- Relatively low risk of antisocial behaviour



Why do people use it?

- Relatively cheap
- Easy to get, easy to take
- No hangover
- Perception it is safe
- Dissociative effect
- “Doctor Google”
- Accidental!
- Pain




Drug related deaths by substance
90
80
70
60
50
40
30
20
10
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
ecstasy
Cathinones
GHB
Synthetic cannabinoids
Other NPS
ketamine

Deaths following illicit ketamine use in England, Wales and Northern Ireland 1999–2024: An update report to inform the reclassification debate

- Increased twenty-fold in the last decade
- More deaths in the context of poly & dependent drug use (stimulants, opioids, benzos, alcohol)
- Majority (88.9%) deemed accidental
- 85.2% male
- Average age 33.7 years

Ketamine is now the third most common drug in under-18s in treatment

16,212

under-18s in drug and alcohol treatment, 2024–25

1,465

of them reported ketamine use, up from 512 in 2021–22

0.9%

of pupils aged 11–15 had used it (2023), doubled in a decade

11%

of 15-year-olds had been offered ketamine

Sources: OHID children’s substance misuse treatment statistics 2024–25; NHS England, Smoking, Drinking and Drug Use among Young People 2023

Who are these children?

Boy or girl? Which neighbourhood? What else is going on in their lives?

43 of 60
were girls

~2 in 3
lived in the most deprived fifth of neighbourhoods

72%
had experienced emotional trauma in childhood

1 in 5
had experience of the care system

27%
had ADHD and/or autism (~6% generally)

1–2 yrs
of ketamine use before referral; half used other drugs

Source: first 60 referrals to the Alder Hey KIU clinic for under-16s, Arch Dis Child 2026

> Urology. 2007 May;69(5):810-2. doi: 10.1016/j.urology.2007.01.038.

Ketamine-associated ulcerative cystitis: a new clinical entity

Rohan Shahani [1], Cathy Streutker, Brendan Dickson, Robert J Stewart

BJUI
BJU INTERNATIONAL

The destruction of the lower urinary tract by ketamine abuse: a new syndrome?

Peggy Sau-Kwan Chu, Wai-Kit Ma*, Simon Chun-Wing Wong, Ringo Wing-Hong Chu, Cheung-Hing Cheng, Shun Wong†, Johnny Man-li Tse‡, Fei-Lung Lau§, Ming-Kwong Yiu* and Chi-Wai Man

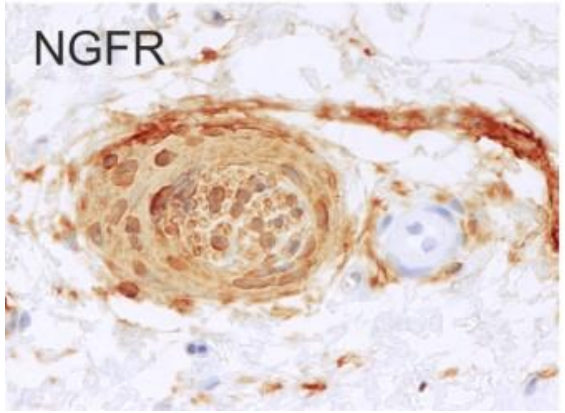
2008 BJU INTERNATIONAL | 102, 1616–1622

Mechanism of Urological Damage

(A) Direct toxic damage to the urothelium by ketamine and metabolites

(B) Bladder barrier dysfunction: epithelial dysfunction with urinary leakage

(C) Neurogenic inflammation



(D) Eosinophilic infiltration - IgE mediated inflammation

(E) NOS-COX mediated inflammation

(F) Microvascular injury – NMDA receptors on endothelial cells

Clinical Syndrome

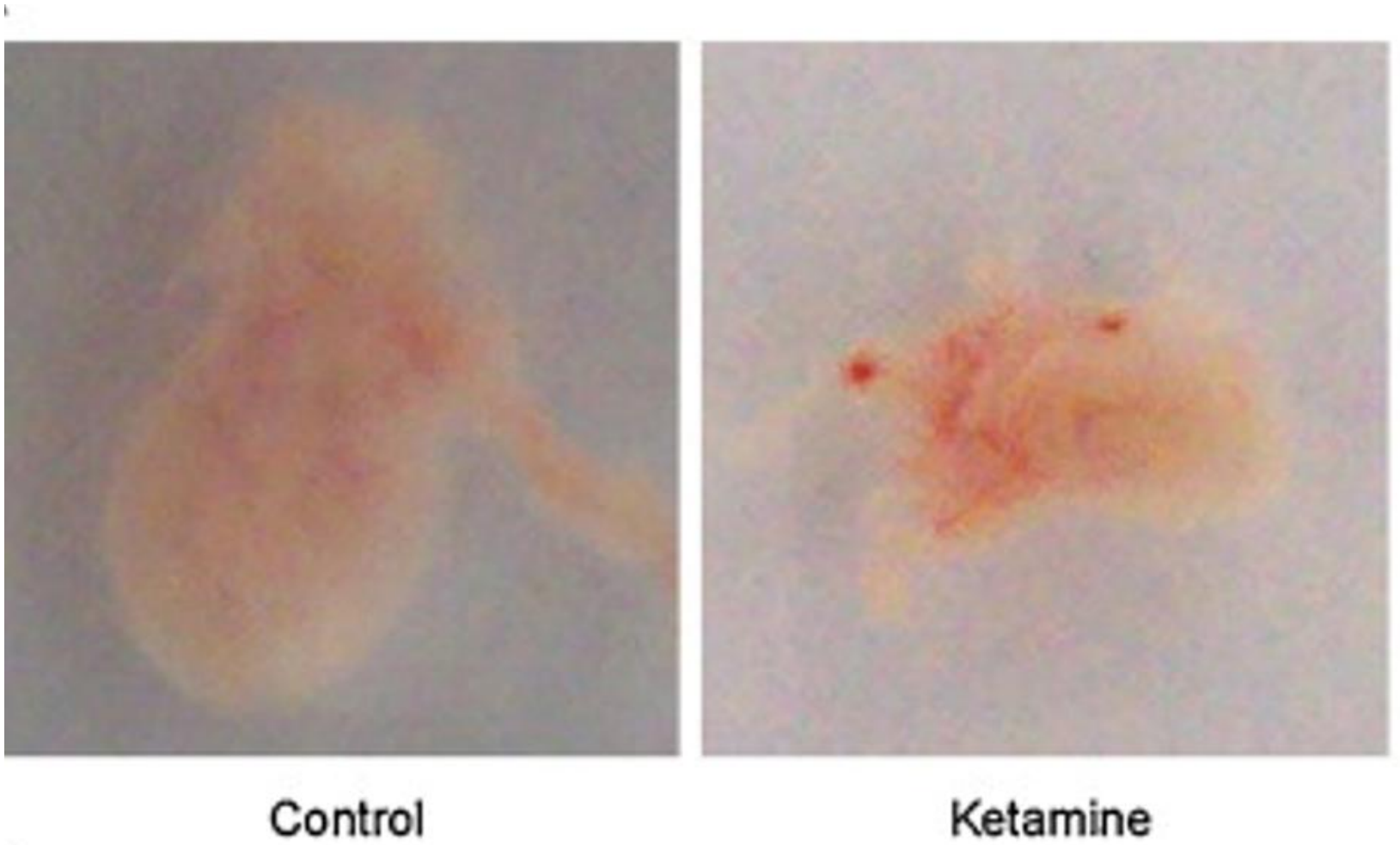
Bladder

- Severe Storage Bladder Symptoms
- Urge Incontinence
- Small capacity bladder
- Painful Bladder
- Visible Blood in Urine



Mast cells infiltration and decreased E-cadherin expression in ketamine-induced cystitis

Mengqiang Li[a], Kang Yang[b], Xiujian Wang[b], Xiaodong Xu[c], Ling Zhu[b], Huili Wang[b,*]



Uropathy - Clinical Syndrome

Upper Tract

- Vesico-ureteric reflux
- Ureteric Strictures
- Papillary Necrosis
- Renal Infarction
- Chronic Renal Failure





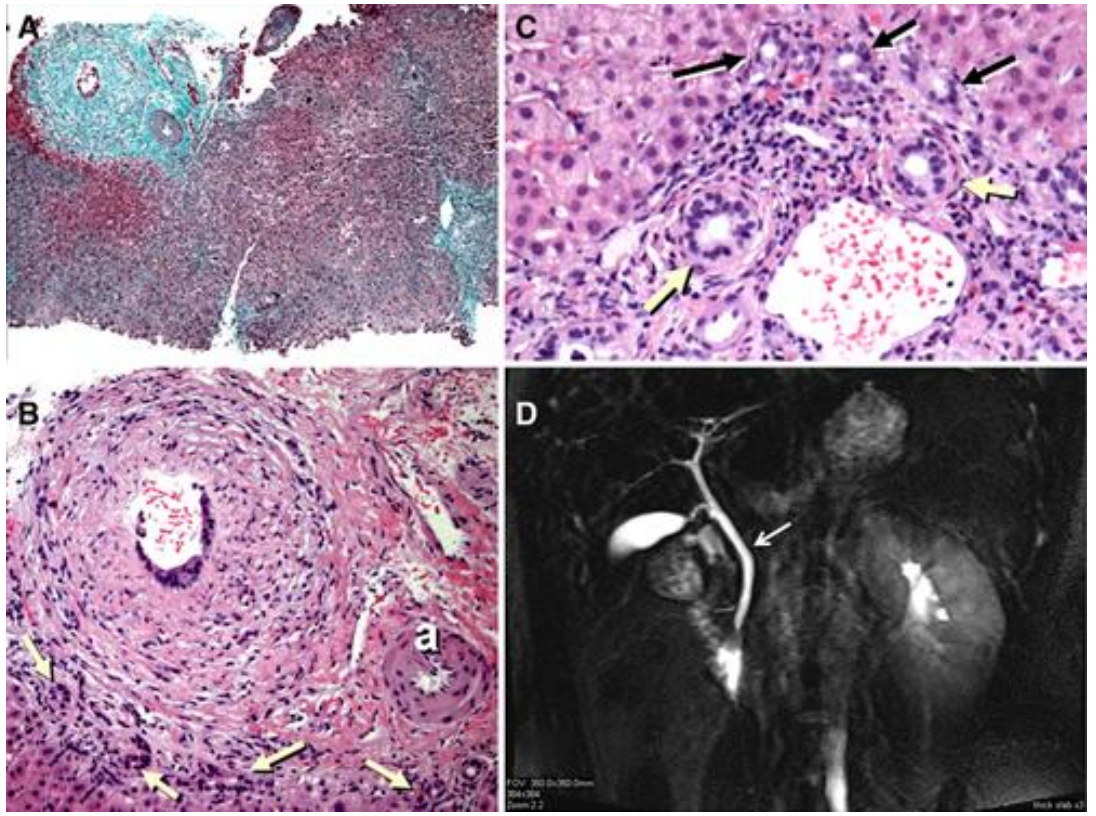
The Risk of Upper Urinary Tract Involvement in Patients With Ketamine-Associated Uropathy

Chi-Hang Yee[1], Jeremy Yuen-Chun Teoh[1], Pui-Tak Lai[1], Vivian Yee-Fong Leung[2], Winnie Chiu-Wing Chu[3], Wai-man Lee[1], Yuk-Him Tam[4], Chi-Fai Ng[1]

Variable	Entire Cohort (n = 572)	Without hydronephrosis (n = 476)	With hydronephrosis (n = 96)	P-value
Age (yr)	25.3 ± 3.8	25.0 ± 3.8	26.3 ± 3.7	0.002
Sex				0.280
Female	323 (56.5)	264 (55.5)	59 (61.5)	
Male	249 (43.5)	212 (44.5)	37 (38.5)	
Achieved abstinence	207 (36.2)	175 (36.8)	32 (33.3)	0.523
Duration of abuse (mo)	86.8 ± 37.7	84.6 ± 37.7	97.6 ± 35.7	0.002
Amount consumed per week (g)	20.4 ± 18.1	20.7 ± 18.1	18.6 ± 18.1	0.306
PUF total score	21.0 ± 7.6	20.6 ± 7.7	22.9 ± 6.8	0.006
Functional bladder capacity (mL)	139.9 ± 125.5	147.3 ± 130.8	103.1 ± 86.5	0.002
Serum creatinine > 100 μmol/L	25 (4.4)	15 (3.2)	10 (10.4)	0.001
Deranged serum liver enzymes	258 (45.1)	200 (42.0)	58 (60.4)	< 0.001

Other Effects

- Sexual Dysfunction
- GI Dysfunction
- Hepatobiliary Dysfunction
- Cognitive Impairment
- Cardiac Dysfunction
- ??Potential Malignancy



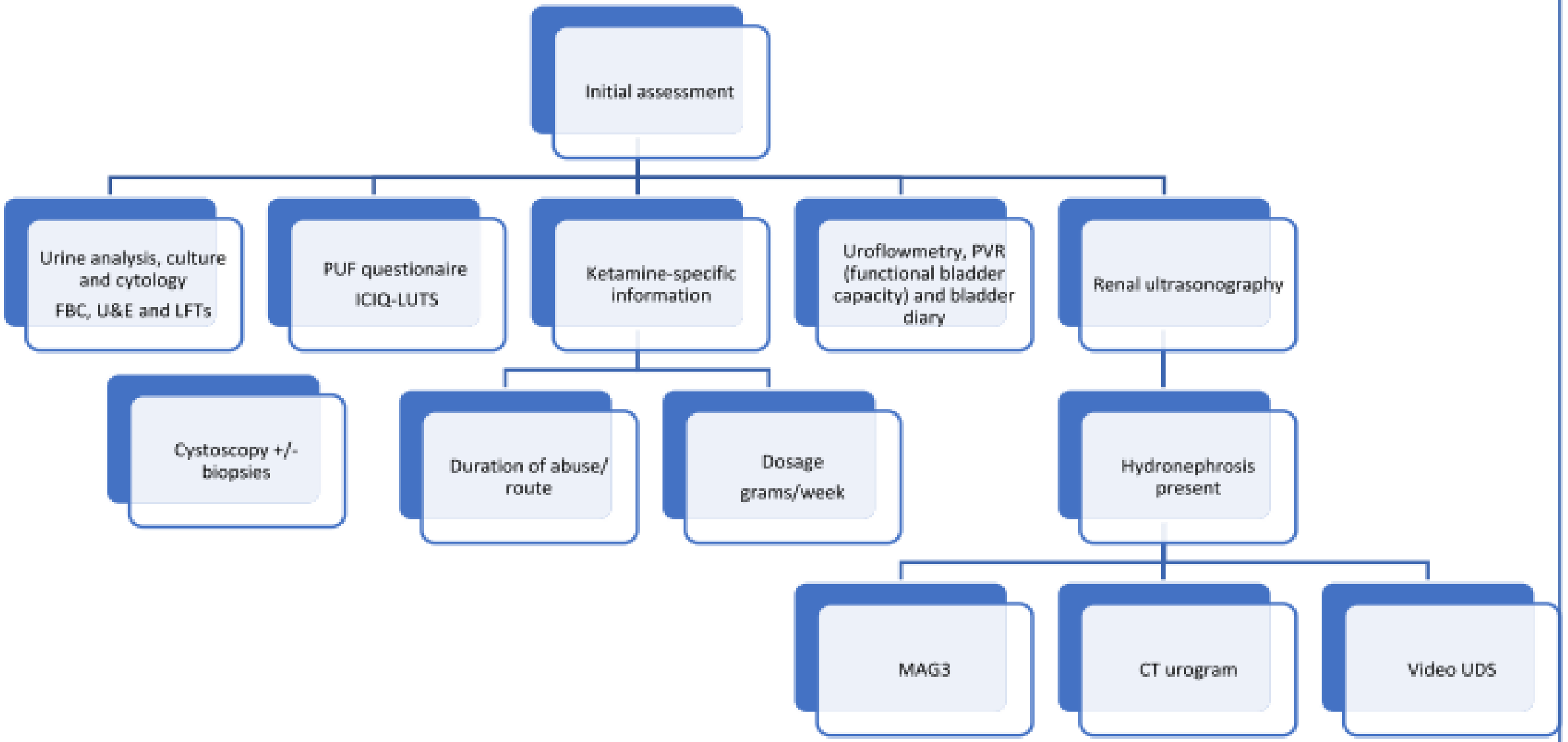
BJU Int 2024 doi:10.1111/bju.16404

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Review

British Association of Urological Surgeons Consensus statements on the management of ketamine uropathy

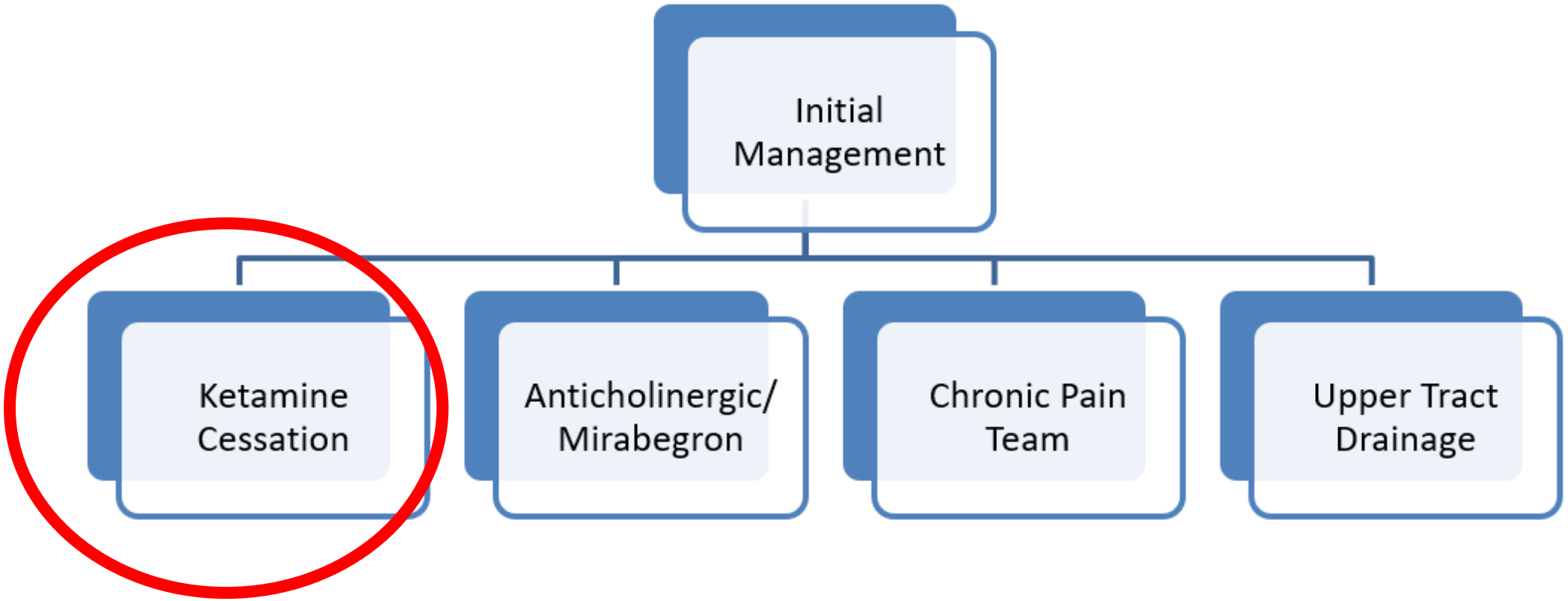
Mohammed Belal[1], Alison Downey[2], Ruth Doherty[3], Ased Ali[2], Hashim Hashim[4], Andy Kozan[5], Magda Kujawa[6], Mahreen Pakzad[7], Tina Rashid[8], Nadir Osman[10], Arun Sahai[9], Suzanne Biers[11] on behalf of the BAUS Section of Female, Neurological and Urodynamic Urology


Initial assessment
Urine analysis, culture and cytology
FBC, U&E and LFTs
PUF questionaire
ICIQ-LUTS
Ketamine-specific information
Uroflowmetry, PVR (functional bladder capacity) and bladder diary
Renal ultrasonography
Cystoscopy +/- biopsies
Duration of abuse/ route
Dosage
grams/week
Hydronephrosis present
MAG3
CT urogram
Video UDS

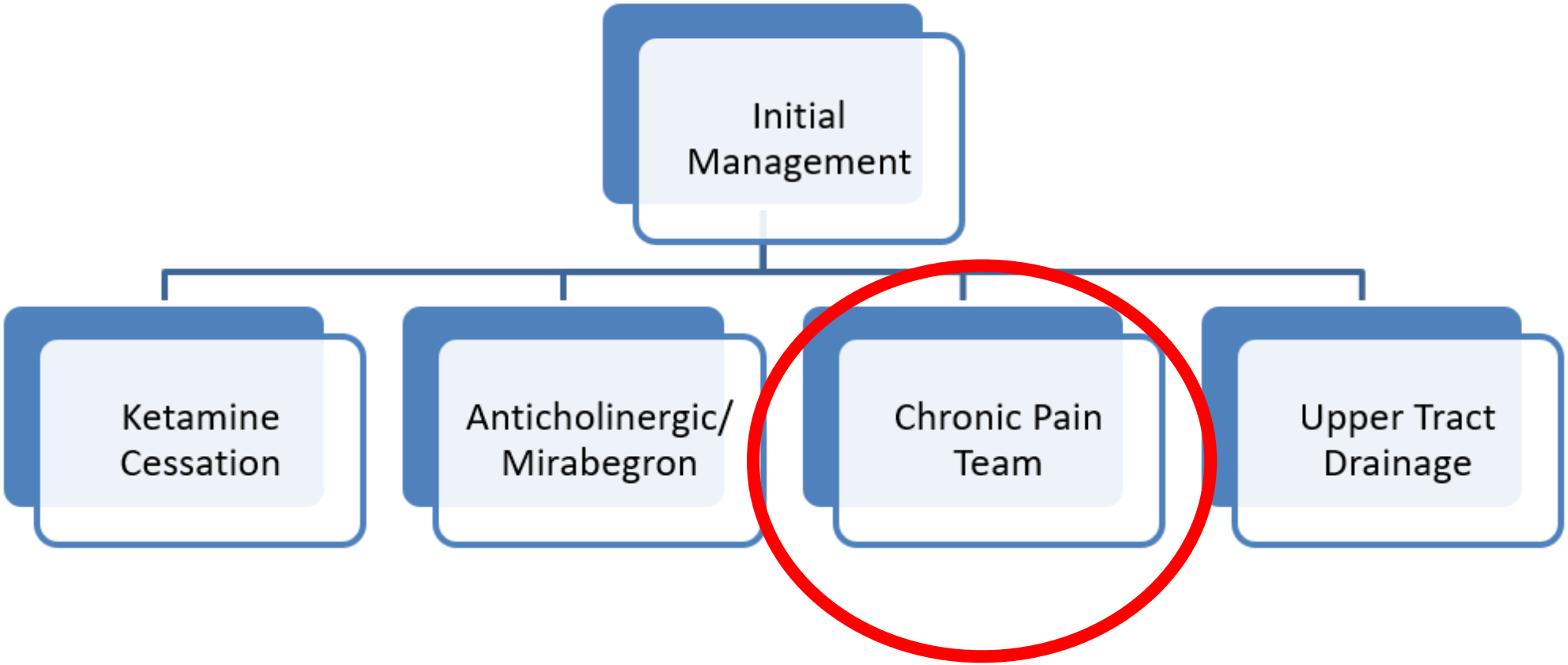
Cystoscopy – my own tips!

- Patient expectations – aim is to rule out cancer, not diagnose ketamine uropathy or treat symptoms
- General anaesthetic - warn anaesthetist!!: can elicit a significant pain response
- Minimal irrigation – enough to safely see
- Don’t empty bladder once scope is in
- Avoid touching the urothelium with the scope
- Biopsy? – own judgement call




Initial Management
Ketamine Cessation
Anticholinergic/ Mirabegron
Chronic Pain Team
Upper Tract Drainage

Variable	Active abusers	Ex-abusers	P
Number of patients	214	104	
Number of female patients (%)	119 (55.6)	55 (52.9)	0.65
Mean (SD)			
age, years	24.7 (2.9)	24.4 (3.2)	0.26
duration of ketamine use, months	82.1 (35)	76.1 (40)	**0.02**
ketamine use, g/week	17.0 (10.1)	22.7 (22.9)	0.10
Frequency of ketamine use, n (%)			0.35
Daily	168 (78.5)	82 (78.8)	
1–6 days/week	46 (21.5)	19 (18.3)	
< once/week	0	3 (2.9)	
Prevalence of history of polysubstance abuse, n (%)	98 (45.8)	62 (59.6)	**0.02**
Mean (SD):			
Voided volume, mL	85.4 (90.7)	126.5 (97)	**<0.001**
Bladder capacity, mL	126.7 (105.7)	204.8 (147)	**<0.001**
Peak flow rate, mL/s	12.6 (8.2)	15.9 (7.4)	**<0.001**
Bladder emptying efficiency, %	66.2 (29.6)	74.3 (25)	0.09
PUF score	24.1 (6.4)	19.3 (8.2)	**<0.001**
Prevalence of positive urine culture for bacteria, n (%)	13 (6.1)	3 (2.9)	0.22
*Prevalence of hydronephrosis on US, n/N (%)	10/106 (9.4)	3/54 (2.9)	0.40
Abnormal creatinine level of >90 µmol/L, n (%)	14 (6.5)	9 (8.7)	0.5

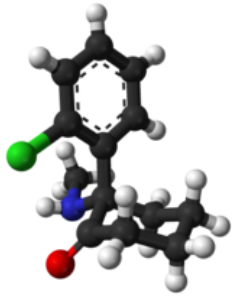

Initial Management
Ketamine Cessation
Anticholinergic/ Mirabegron
Chronic Pain Team
Upper Tract Drainage

Pain Management

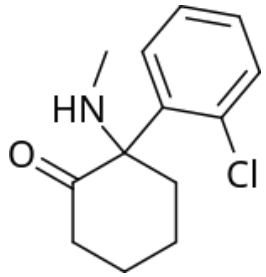
- No specific pathway/guidance for ketamine uropathy yet
- Assumed to be neuropathic therefore start with amitriptyline
- Pain team involvement early (if possible)
- Anecdotally nefopam and elmiron used with good effect
- Magnesium??

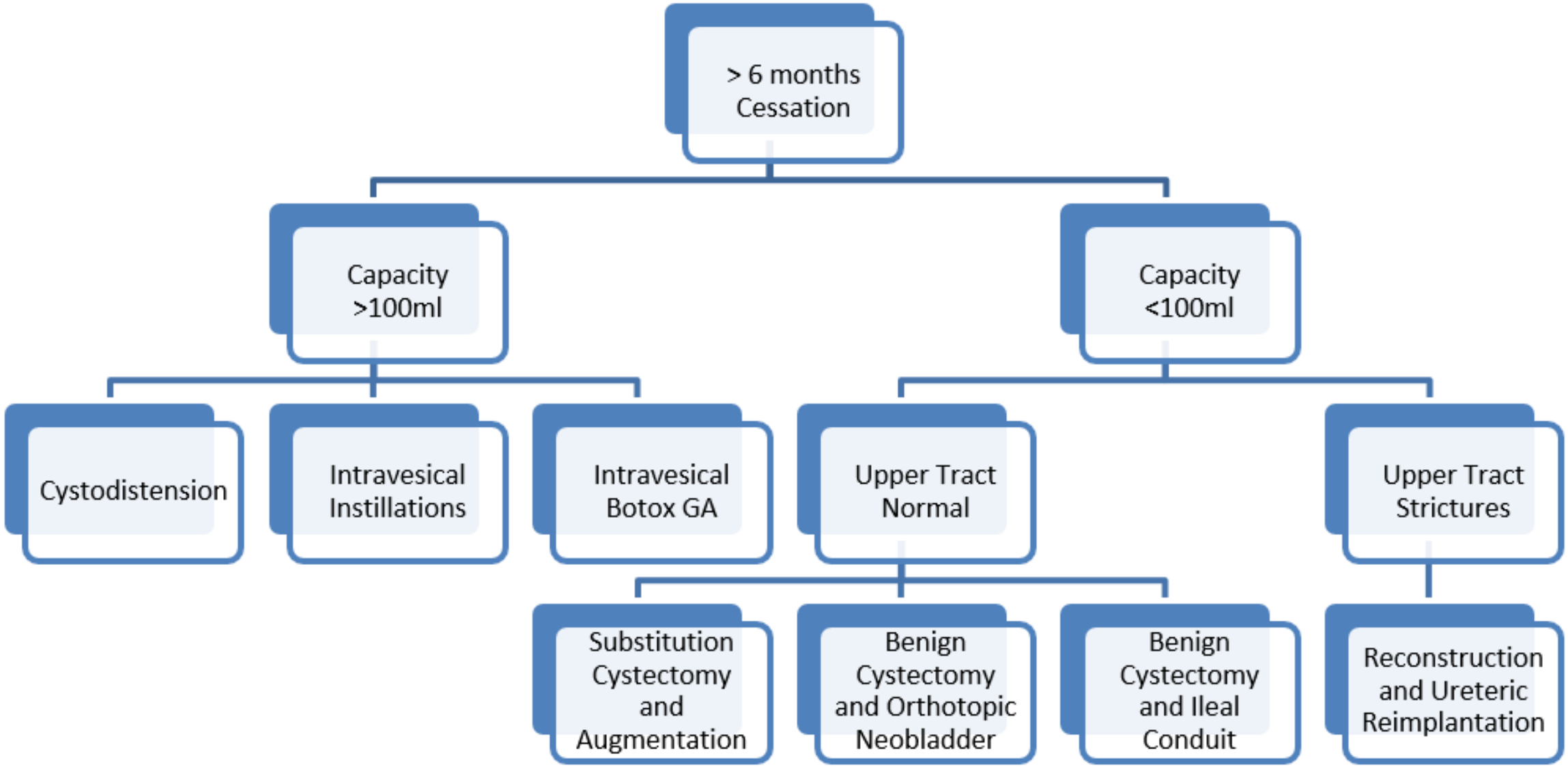
NICE
National Institute for Health and Care Excellence

Magnesium – Why Give It?



- Blocks NMDA receptors – analgesia and prevents chronic pain
- Prevents Withdrawals
- Prevents Arrhythmia
- Helps Asthma
- Improves Migraines and Headaches
- Prevents Epilepsy
- Protects against Eclampsia and Protects Foetal Brain
- Lowers blood pressure and improves microcirculation
- Helps Wound Healing (Ulcers)
- Anti-inflammatory
- Relaxes Muscles
- Prevents Acid Build Up
- Prevents Constipation (especially opioid-associated)
- Improves Cellular Metabolism
- etc. etc. etc…….

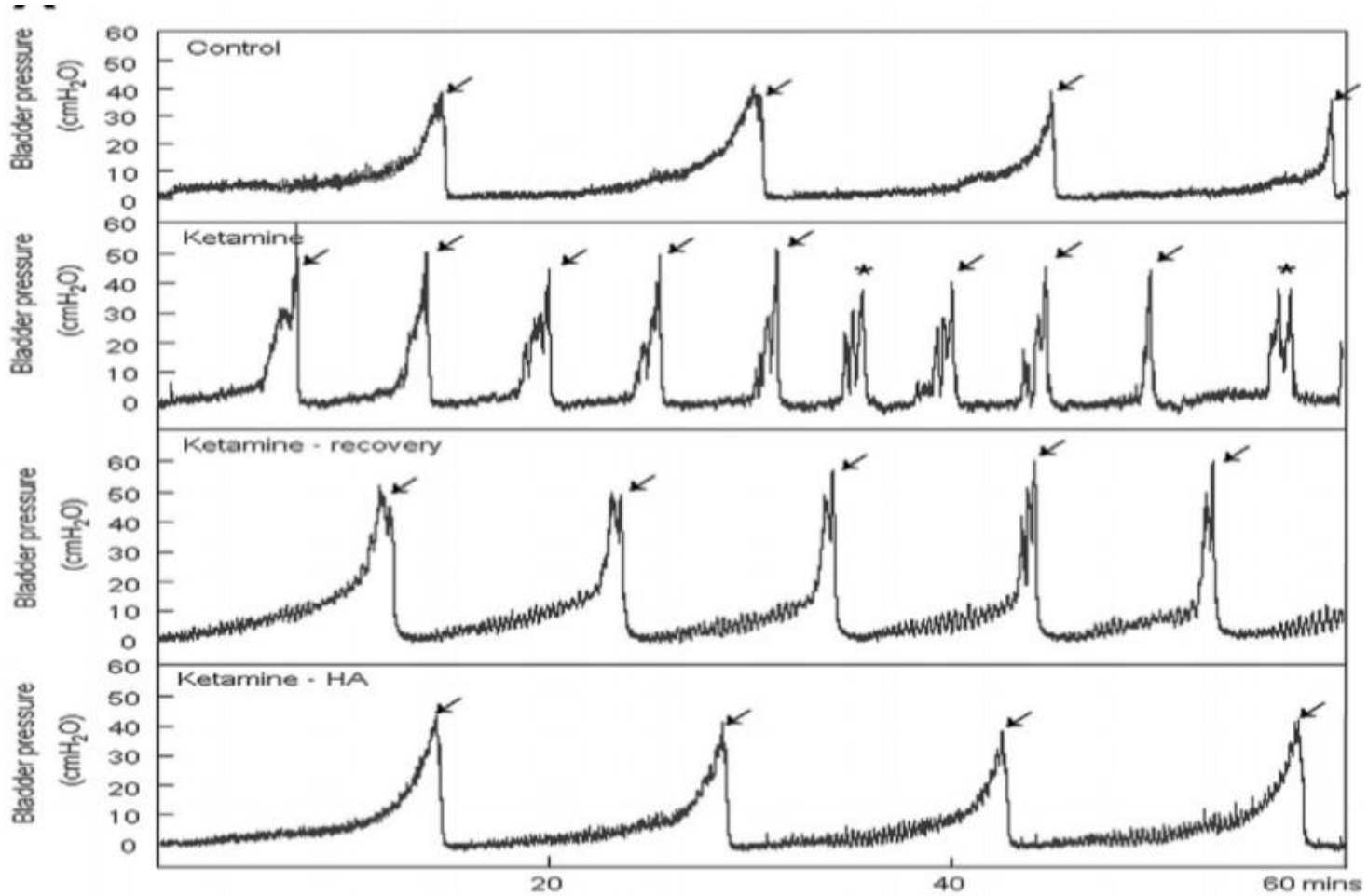



> 6 months Cessation
Capacity >100ml
Capacity <100ml
Cystodistension
Intravesical Instillations
Intravesical Botox GA
Upper Tract Normal
Upper Tract Strictures
Substitution Cystectomy and Augmentation
Benign Cystectomy and Orthotopic Neobladder
Benign Cystectomy and Ileal Conduit
Reconstruction and Ureteric Reimplantation

Elucidating Mechanisms of Bladder Repair after Hyaluronan Instillation in Ketamine-Induced Ulcerative Cystitis in Animal Model

The American Journal of PATHOLOGY

Yi-Lun Lee,*† Kun-Ling Lin,*‡ Shu-Mien Chuang,§ Yung-Chin Lee,¶‖ Mei-Chin Lu,**†† Bin-Nan Wu,‡‡ Wen-Jeng Wu,* Shyng-Shiou F. Yuan,‡§ Wan-Ting Ho,¶‖ and Yung-Shun Juan*¶‖§§¶¶



J Int Med Res. 2020 Nov; 48(11): 0300060520973100. PMCID: P
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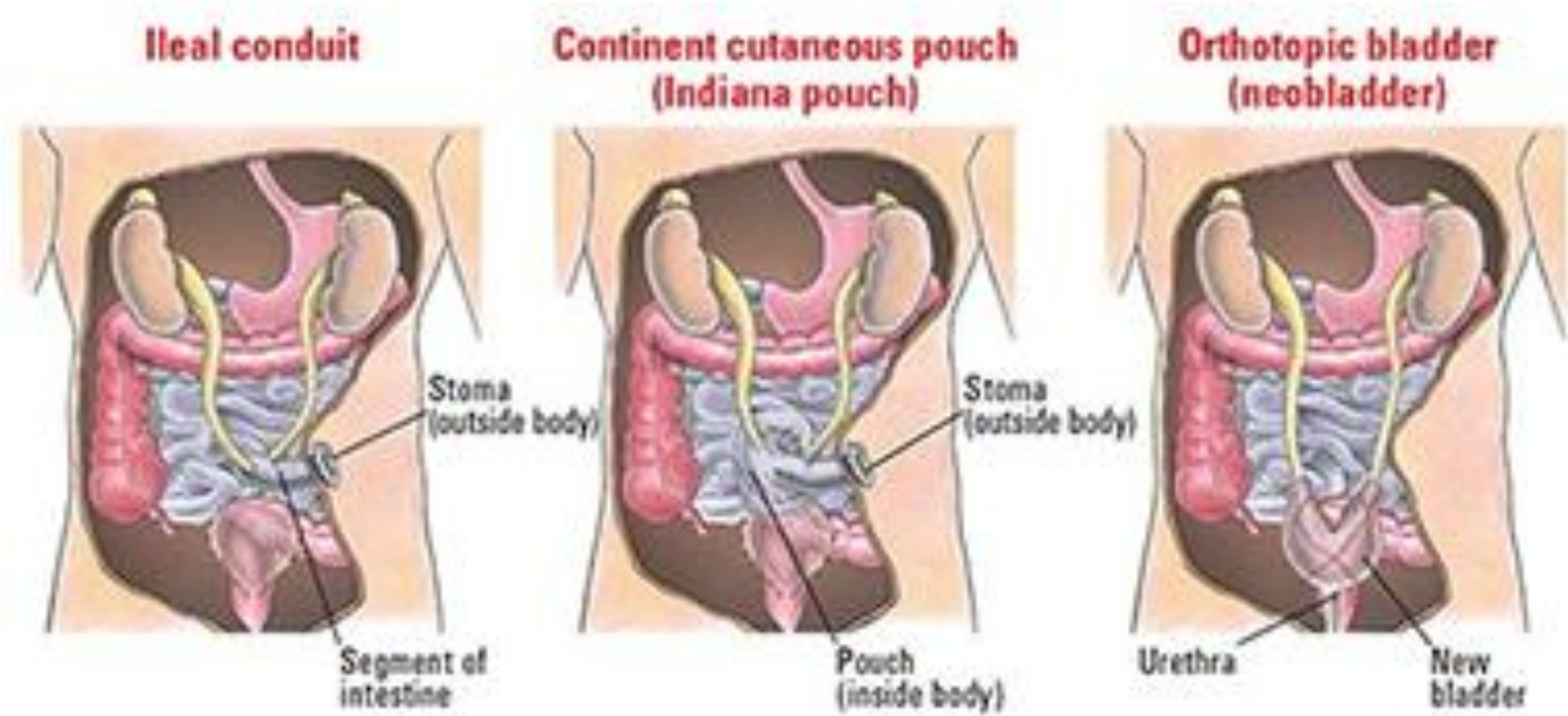
Comparison of intravesical instillation of hyaluronic acid with intradetrusor botulinum toxin A injection or cystoscopic hydrodistention for ketamine-associated cystitis

Bingkun Li,[1,*] Qu Leng,[1,2,*] Chuanyin Li,[1] Xiao Tan,[1] Wei Su,[1] and Chaoming Li[1]

- RCT 36 patients
- Randomised to hyaluronic acid instillations following either 200units botox or hydrodistension
- No ISC in botox group
- At 12 months significantly better outcomes in hydrodistention group in capacity and pain scores
- Poorer outcomes in general if fibrosis in biopsy results

Reconstructive Surgery

- Absolute pre-requisite to cease ketamine use
- Careful patient and procedure selection
- Psychology Input
- Stoma Team input
- Need to manage patient expectations


Ileal conduit
Stoma (outside body)
Segment of intestine
Continent cutaneous pouch (Indiana pouch)
Stoma (outside body)
Pouch (inside body)
Orthotopic bladder (neobladder)
Urethra
New bladder

Clinical outcomes of augmentation cystoplasty in patients suffering from ketamine-related bladder contractures

Int Urol Nephrol (2013) 45:1245–1251

Chi-Fai Ng · Peter K. F. Chiu · Miu-Ling Li ·
Chi-Wai Man · Simon S. M. Hou ·
Eddie S. Y. Chan · Peggy S. K. Chu

- Post op capacity 450-500ml
- All patients resumed ketamine use
- 2 developed ureteric strictures
- Metabolic abnormalities with non-compliance with ISC
- All 4 defaulted from follow-up

Functional Urology

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The effects of recreational ketamine cystitis on urinary tract reconstruction – a surgical challenge

Néha Sihra, Jeremy Ockrim and Dan Wood

Department of Urology, University College London Hospital, London, UK

- 10 year retrospective review of ketamine uropathy patients
- 14 patients underwent major surgical reconstruction
- Higher rate of post-operative complications than expected

Indication	Primary procedure	Complication	Management	Further complications	Long-term outcome
Small capacity, painful fibrotic bladder	Cystectomy, orthotopic right colonic neobladder and Mitrofanoff	Left ureteric stricture	Ureteric re-implantation	Nil	Pain free, normal renal function
Bladder pain	Ileal conduit	Uretero-ileal anastomotic leak and collection	Bilateral nephrostomies followed by antegrade stents	Nil	Pain free, normal renal function; awaiting long-term plan
Severe LUTS with fibrotic bladder	Cystectomy and neobladder	Postoperative high-pressure DO	Intermittent self-catheterisation	Nil	Asymptomatic, normal renal function
Bladder pain with fibrotic bladder	Cystectomy and ileal neobladder and Mitrofanoff	Adhesional small bowel obstruction with avulsed ureters from neobladder	Laparotomy, small bowel resection, adhesiolysis and ureteric re-implantation	Ascitic drainage, debridement of necrotic wound, ureteric leak requiring nephrostomies and stents, left-sided obstruction requiring re-implantation	Recurrent UTIs but pain free and normal renal function
Bilateral ureteric strictures, high-pressure small capacity bladder, chronic renal failure	Augmentation cystoplasty and Mitrofanoff plus insertion of bilateral ureteric stents	Further renal impairment	Left kidney transplant		Poor renal function requiring ureteric stents and dialysis
Small capacity bladder with painful voiding	Cystectomy and orthotopic ileocolonic neobladder and Mitrofanoff	Nil			Died – IP mortality unrelated to surgery, cause unknown
Bilateral ureteric strictures, small capacity fibrosed bladder with pain and severe LUTS	Cystectomy and orthotopic colonic neobladder, right ureteric ileal chute and left ureteric re-implantation	Candida urosepsis			Recurrent UTIs and persistent hydronephrosis – lost to follow-up
Small capacity bladder with severe LUTS	Augmentation cystoplasty	Nil			Asymptomatic, normal renal function
Small capacity fibrosed bladder with pain and severe LUTS	Cystectomy and neobladder	Right ureteric obstruction	Nephrostomy, followed by ureteric stent	Left ureteric obstruction	Awaiting bilateral ureteric re-implantation
Small capacity fibrosed bladder with pain and severe LUTS	Cystectomy and Indiana ileocolonic orthotopic neobladder and Mitrofanoff	Urinary leak and sepsis, acute ileo-colonic leak and faecal fistula	Laparotomy, peritoneal washout, drainage of subphrenic collection and end colostomy	Pneumonia and upper limb DVT. Elective reversal of colostomy and repair of incisional hernia with post-operative wound infection	Pain free, normal renal function
Small capacity bladder with pain	Augmentation cystoplasty and Mitrofanoff	Nil			Pain free, normal renal function
Bilateral ureteric strictures, small capacity bladder with pain	Augmentation cystoplasty, ureteric re-implantation into ileal chute	Further renal impairment			Awaiting nephrology input
Small capacity bladder with pain	Augmentation ileocystoplasty and Mitrofanoff	Nil			Pain free, normal renal function
Bilateral ureteric strictures, small capacity bladder with pain	Caecocystoplasty, bilateral ileal ureteric chute, Mitrofanoff	Postoperative intra-abdominal collection managed conservatively. Bilateral ureteric strictures at level of anastomosis	Bilateral nephrostomies		Awaiting revision of anastomosis

DVT, deep venous thrombosis.

Safeguarding Issues















What are the barriers to care?

- Education – Clinicians, Patients, Addiction services
- Access – GP, Urology, Pain Team, A&E, Addiction services
- Cross-specialty care – no pathways in place naturally; who is in charge?
- Communication/co-ordination between community and secondary care
- Stigma of drug use
- Stigma of urinary incontinence
- Geography – multiple NHS trusts, councils, addiction services
- Emerging Challenges – “Pink Cocaine” “2CB”





BAUS Consensus

NICE Neuropathic Pain Guidelines

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