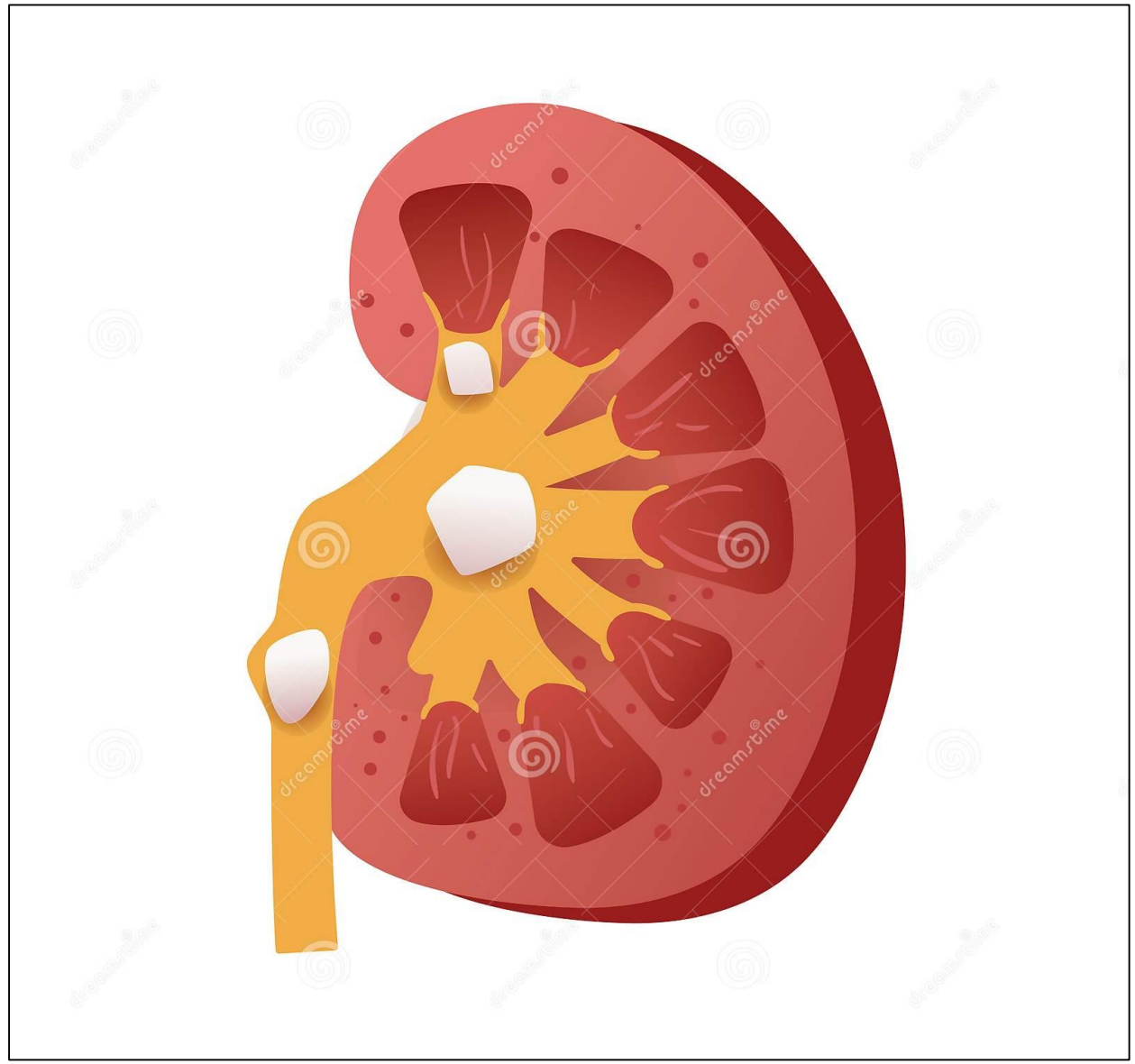
Imperial College Healthcare NHS Trust

Update on stone disease

Ranan DasGupta
MA (Cantab) MD FRCS(Urol)
Consultant Urological Surgeon
Imperial College Healthcare



NICE National Institute for Health and Care Excellence

NICE guideline

Renal and ureteric stones: assessment and management

NICE guideline

Published: 8 January 2019
www.nice.org.uk/guidance/ng118

Urology: excellence in acute urinary tract stone management

A practical guide to delivery

XX 2021

EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY (ESWL) FOR STONES

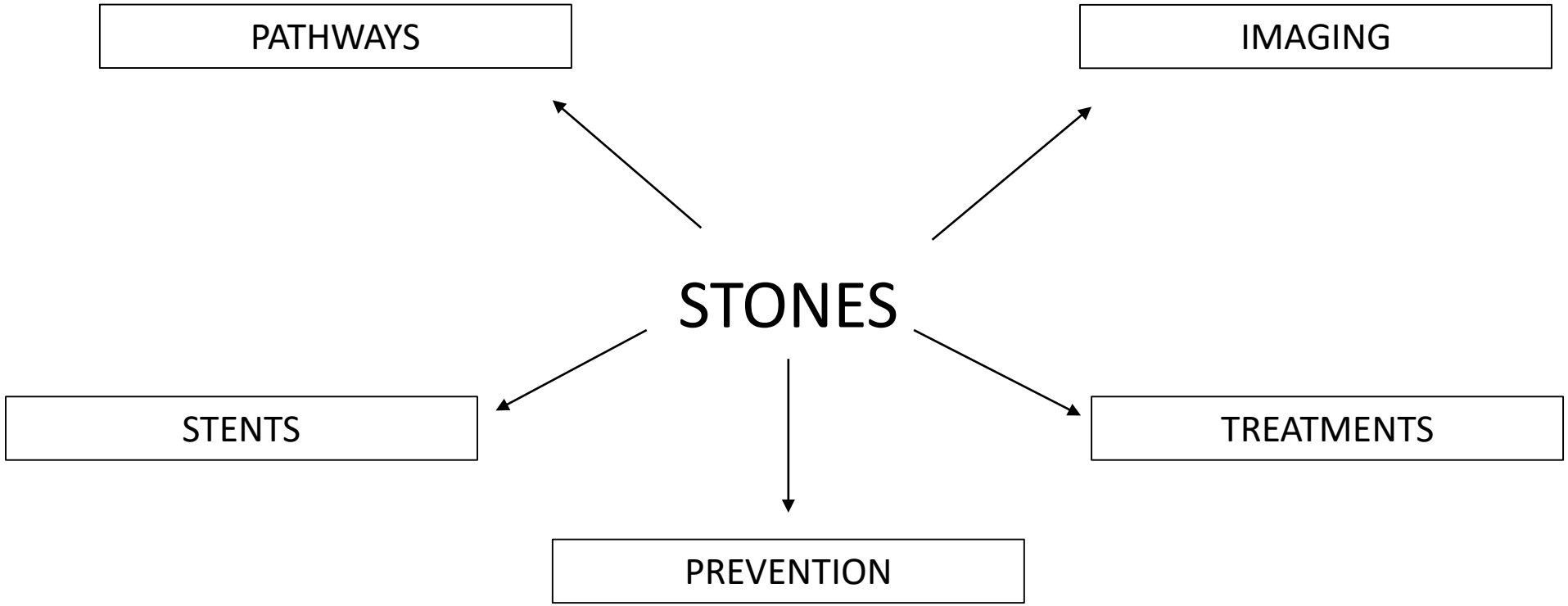
Information about your procedure from
The British Association of Urological Surgeons (BAUS)

This leaflet contains evidence-based information about your proposed urological procedure. We have consulted specialist surgeons during its preparation, so that it represents best practice in UK urology. You should use it in addition to any advice already given to you.

To view the online version of this leaflet, type the text below into your web browser:
http://www.baus.org.uk/_userfiles/pages/files/Patients/Leaflets/ESWL.pdf

Key Points

- Lithotripsy is a low risk, non-invasive way of treating stones in the kidney or ureter (the tube between your kidney and bladder)
- Shockwaves are focused through the skin, onto the stone, using X-ray or ultrasound to target them
- Some stones are too hard and may not break up even after re-treatment
- The commonest after-effects are bleeding and temporary pain as the fragments pass out


PATHWAYS
IMAGING
STONES
STENTS
TREATMENTS
PREVENTION

Pathways

ACUTE

THINK!

WHY A&E?

A&E is for emergencies and life - threatening illnesses **only**

www.WhyAandE.nhs.uk


Emergency Department (A&E)
LONDON AMBULANCE NHS
LONDON
LX67 AHY
BU12 ANX


SINTOFARM
DICLOFENAC 100 mg
Diclofenac sodic 100 mg


ONE
Aquilion

ELECTIVE

Electronic Referral Service

Face-Face vs Virtual

BJUI
BJU International

BJU Int. 2019 Dec;124(6):1034-1039

Clinical, fiscal and environmental benefits of a specialist-led virtual ureteric colic clinic: a prospective study

Martin J. Connor*†, Saiful Miah†, Marie Alexandra Edison†, James Brittain†, Mitra Kondjin Smith†, Milad Hanna†, Tamer El-Husseiny† and Ranan Dasgupta†

*Division of Surgery, Department of Surgery and Cancer, Imperial College London, and †Department of Urology, Imperial College Healthcare NHS Trust, Charing Cross Hospital, London, UK

Objectives

To evaluate the clinical, fiscal and environmental impact of a specialist-led acute ureteric colic virtual clinic (VC) pathway.

Patients and Methods

All patients with uncomplicated acute ureteric colic, referred to a single tertiary centre, were prospectively entered into the study over a 4-year period (January 2015–December 2018). Inclusion criteria were: low-dose non-contrast computed tomography of kidneys, ureters and bladder; white blood cell count <16 × 109/L; pain controlled; normal renal function; and no clinical concern. Primary outcomes were: time (days) from referral to VC outcome; VC outcome (discharge, further VC, face-to-face [FTF] clinic, extracorporeal shockwave lithotripsy [ESWL], ureterorenoscopy [URS], percutaneous nephrolithotomy [PCNL]); and adverse events (sepsis or obstruction). Secondary outcomes were patient and stone demographics, cost and environmental analysis. The minimum follow-up was 3 months.

Results

A total of 1008 patients entered the study, of whom 91.5% (n = 922) were of working age. The median (interquartile range) time from presentation to VC outcome was 2 (4) days. VC outcomes were as follows: 16.3% of patients (n = 164) were discharged; 18.2% (n = 183) were discharged after further VC; 17.2% (n = 173) underwent an intervention; and 48.4% (n = 488) were referred to an FTF clinic. Interventions comprised: PCNL 0.5% (n = 5); ESWL 7.7% (n = 78); and URS 8.9% (n = 90). Stone demographics were as follows: 570 patients (56.5%) had lower, 157 (15.6%) had upper, 96 (9.5%) had mid-ureteric and 163 (16.2%) had renal calculi, and in 22 patients (2.2%) the stones had recently passed. The mean (SD) stone size was 3.5 (2.3) mm. Two adverse events (0.2%) were reported. Introducing a VC saved £145,152 for Clinical Commissioning Groups, the equivalent NHS tariff payment of performing 106 URS procedures or 211 ureteric stent insertions. Overall, 15,085 patient journey kilometres were avoided, equal to 0.70–2.93 metric tonnes of carbon dioxide equivalent production and the need to plant 14.7 trees to achieve carbon balance.

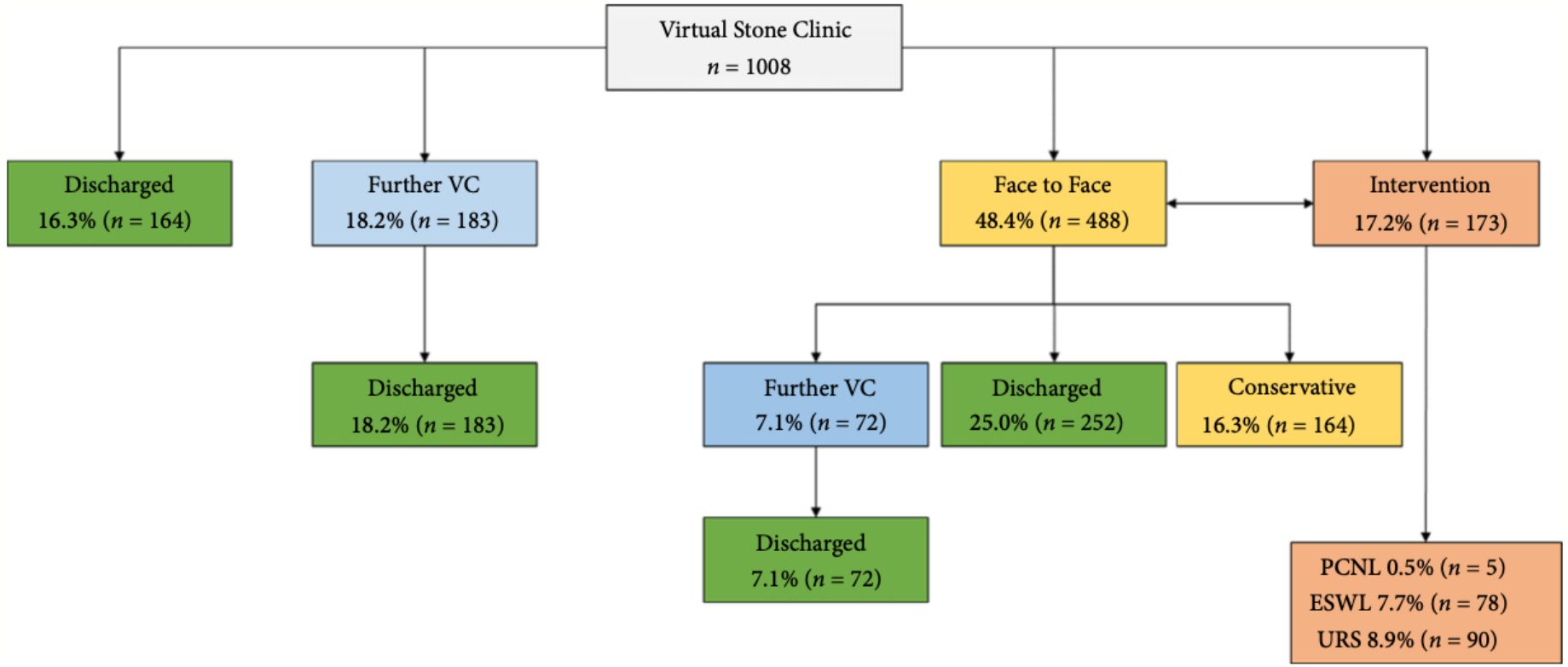
Conclusion

A specialist-led acute ureteric colic VC reduced time to treatment decision to a median of 2 days. This creates additional clinic capacity and reduces the fiscal burden of traditional clinics and their associated carbon footprint.

Keywords

urology virtual clinic, carbon footprint, telemedicine, ureteric colic, #EndoUrology, #UroStone

Fig. 1 Flowchart of outcome from virtual clinic (VC). Patient characteristics suitable for further VC follow-up were able to be contacted on the telephone, clear communication, able to express current symptoms and passage of stone freely. Stone characteristics suitable for further VC follow-up: small stone, further investigation required and/or safety netting to ensure safe upper tract prior to final discharge. ESWL, extracorporeal shock wave lithotripsy; PCNL, percutaneous nephrolithotomy; URS, ureterorenoscopy.



BJU Int. 2019 Dec;124(6):1034-1039

Message

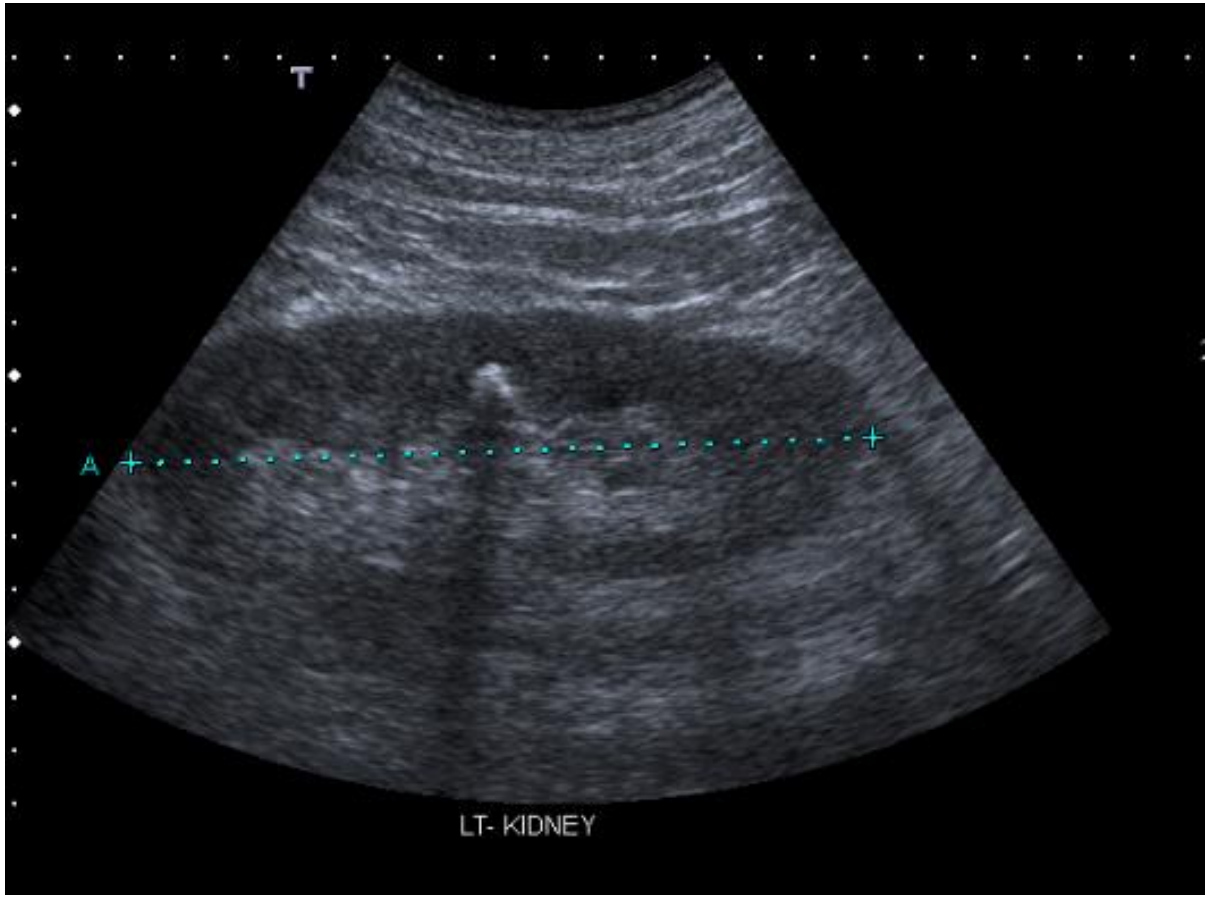
Direct route: Urgent Care Centre/ A&E
Should be directed to the Acute Stone Service in house

Elective route: Virtual or F2F clinic
Ideally with imaging to help triage

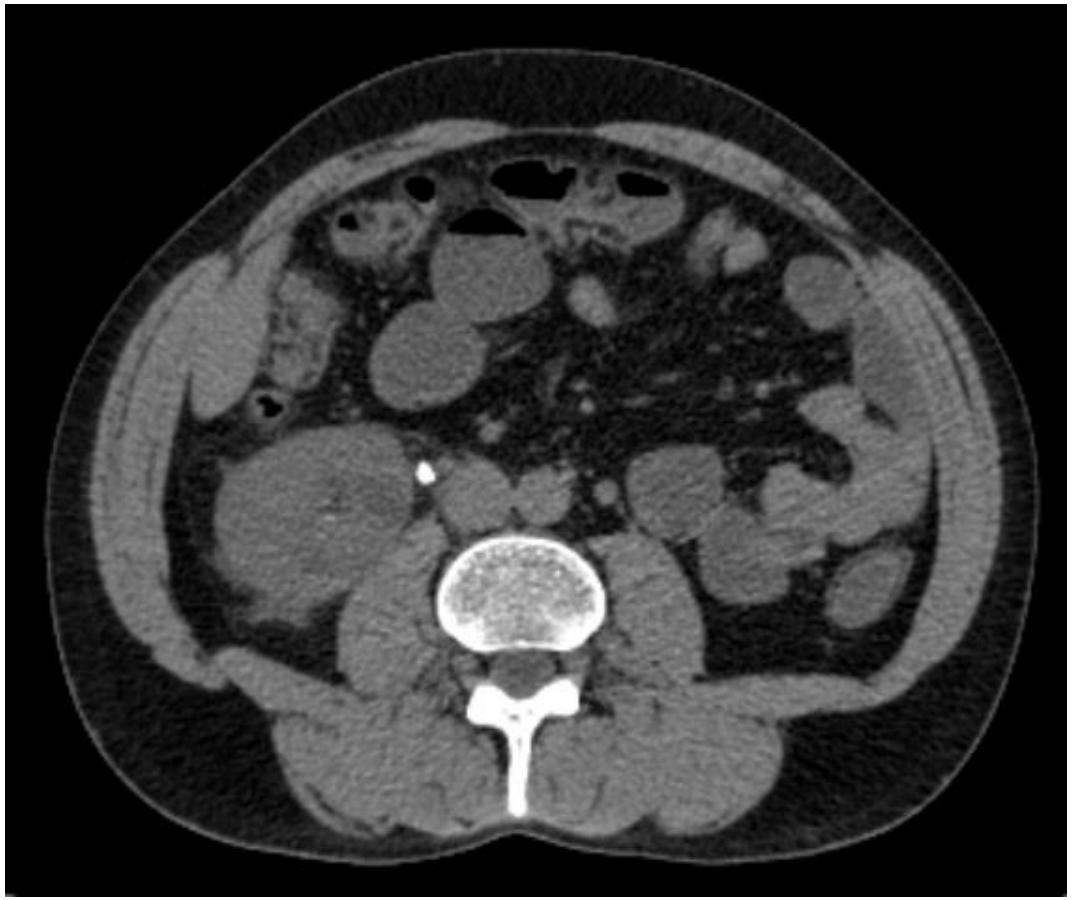
(Sector-wide changes???)

Imaging

Ultrasound



CT KUB



CT KUB

Ultrasound

Pros	Cons
No radiation	Operator dependent
Portable	Limited by body habitus
Can detect hydronephrosis	Cannot visualize entire ureter
Accessibility	Limited images/views recorded
Cheap	

CT

Pros	Cons
Immediate	Radiation dose (ALARA - low dose)
Stone density/location/size	Radiology dept (not portable)
Other pathology in 25%	Expensive (relatively)
Gold standard for acute colic	

Message

NCCT Gold standard for imaging renal colic

Alternative: US

IVU : obsolete
MR: only used selectively in pregnancy

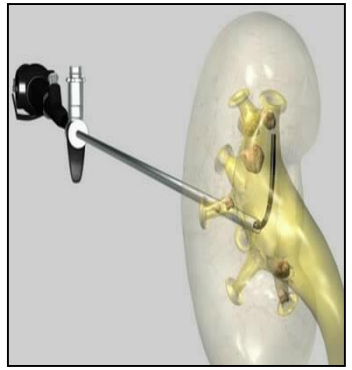
Treatments

Data Item	National Figures		Charing Cross Hospital, London	
Total Cases	2192 (median 16)		28	
Median Age	46 (IQR 34 – 59)		44.5	
Stone size:				
<4.9	991	46.3%	15	53.5%
5– 9.9	998	46.6%	10	35.7%
10 to 19.9	139	6.5%	3	10.7%
>=20	13	0.6%	0	0%
Initial Management Choice				
Conservative Management	1528	69.7%	19	67.8%
Temporising stent insertion	293	13.4%	2	7.1%
Primary SWL	178	8.1%	2	7.1%
Primary ureteroscopy	140	6.4%	3	10.7%
Nephrostomy insertion	41	1.9%	1	3.5%

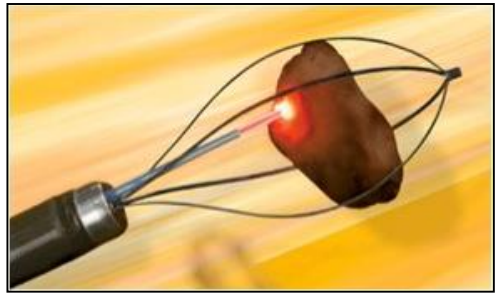
BAUS Renal Colic Audit Nov 2020

Data Item	National Figures		Charing Cross Hospital, London	
Total Cases	2192 (median 16)		28	
Median Age	46 (IQR 34 – 59)		44.5	
Stone size:				
<4.9	991	46.3%	15	53.5%
5– 9.9	998	46.6%	10	35.7%
10 to 19.9	139	6.5%	3	10.7%
>=20	13	0.6%	0	0%
Initial Management Choice				
Conservative Management	1528	69.7%	19	67.8%
Temporising stent insertion	293	13.4%	2	7.1%
Primary SWL	178	8.1%	2	7.1%
Primary ureteroscopy	140	6.4%	3	10.7%
Nephrostomy insertion	41	1.9%	1	3.5%

MAJORITY of acute stones pass spontaneously

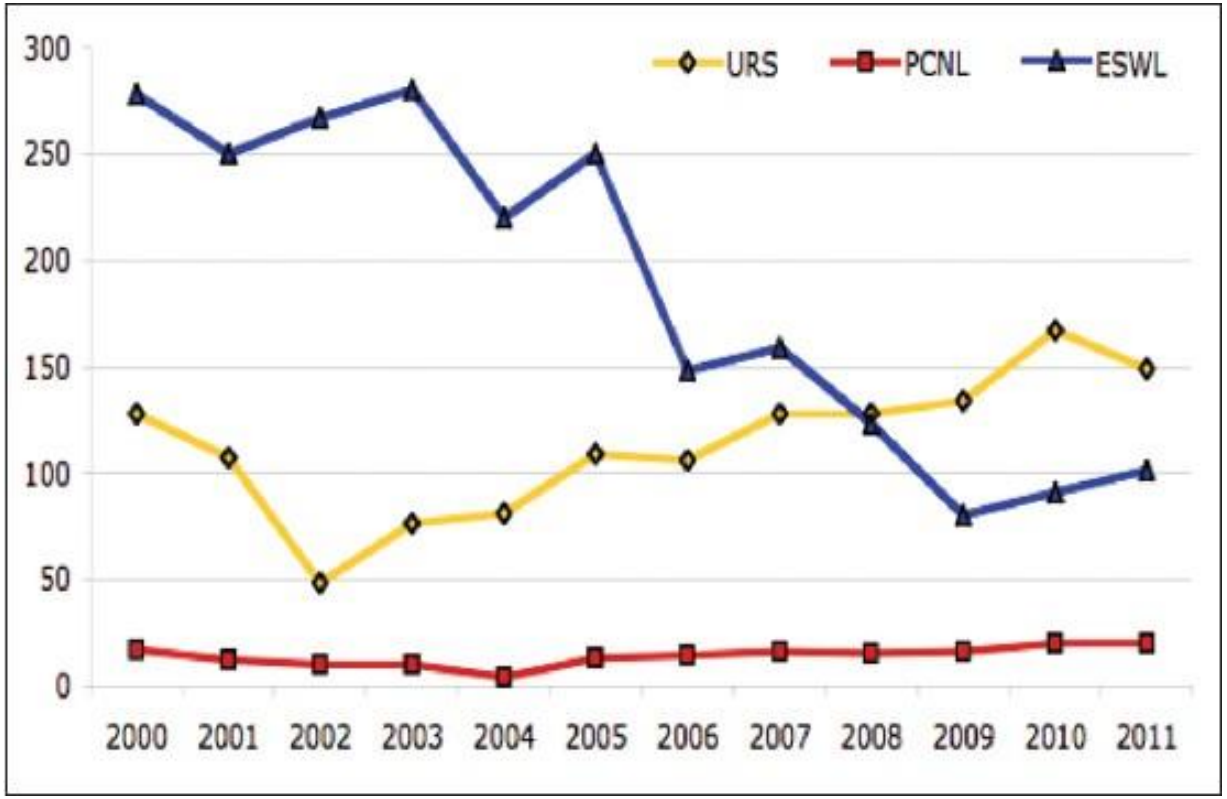


Percutaneous nephrolithotomy

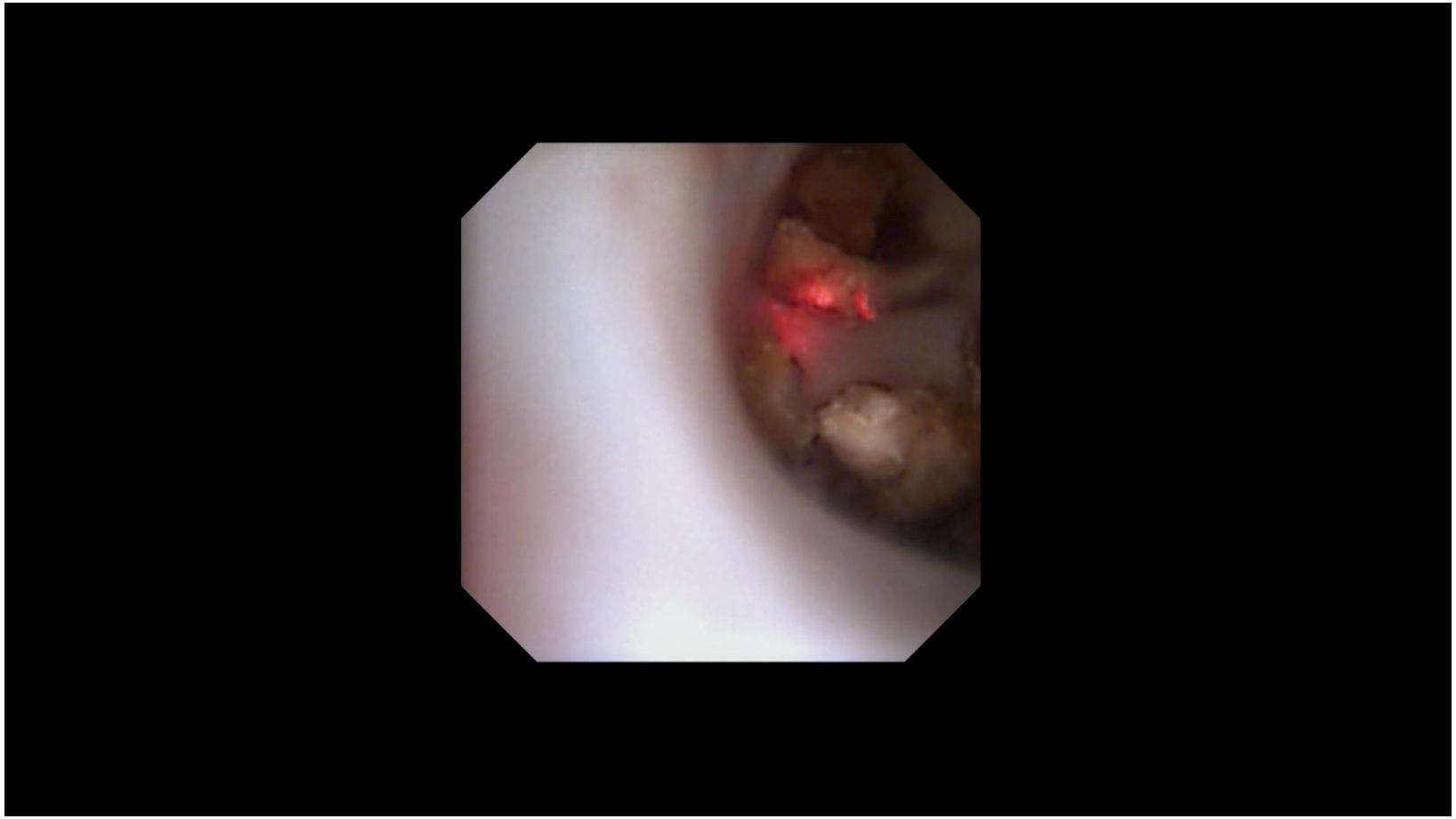


Flexible Ureterorenoscopy/ laser

Lithotripsy
(ESWL)


300
250
200
150
100
50
0
URS
PCNL
ESWL
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

Germany



Medical expulsive therapy in adults with ureteric colic: a multicentre, randomised, placebo-controlled trial

Robert Pickard, Kathryn Starr, Graeme MacLennan, Thomas Lam, Ruth Thomas, Jennifer Burr, Gladys McPherson, Alison McDonald, Kenneth Anson, James N'Dow, Neil Burgess, Terry Clark, Mary Kilonzo, Katie Gillies, Kirsty Shearer, Charles Boachie, Sarah Cameron, John Norrie, Samuel McClinton

Summary

Background Meta-analyses of previous randomised controlled trials concluded that the smooth muscle relaxant drugs tamsulosin and nifedipine assisted stone passage for people managed expectantly for ureteric colic, but emphasised the need for high-quality trials with wide inclusion criteria. We aimed to fulfil this need by testing effectiveness of these drugs in a standard clinical care setting.

Lancet 2015; 386: 341–49

Published Online
May 19, 2015
http://dx.doi.org/10.1016/S0140-6736(15)60933-3

Interpretation Tamsulosin 400 µg and nifedipine 30 mg are not effective at decreasing the need for further treatment to achieve stone clearance in 4 weeks for patients with expectantly managed ureteric colic.

EUROPEAN UROLOGY 80 (2021) 46–54

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Platinum Priority – Stone Disease

Editorial by Christian Türk, Aleš Petřík and Andreas Neisius on pp. 55–56 of this issue

Shockwave Lithotripsy Versus Ureteroscopic Treatment as Therapeutic Interventions for Stones of the Ureter (TISU): A Multicentre Randomised Controlled Non-inferiority Trial

Ranan Dasgupta [a,], Sarah Cameron [b], Lorna Aucott [c], Graeme MacLennan [b], Ruth E. Thomas [b], Mary M. Kilonzo [d], Thomas B.L. Lam [e,k], James N'Dow [e], John Norrie [f], Ken Anson [g], Neil Burgess [h], Charles T. Clark [i], Francis X. Keeley Jr [j], Sara J. MacLennan [k], Kath Starr [l], Sam McClinton [e]

[a] *Department of Urology, Imperial College Healthcare NHS Trust, London, W2 1NY, UK;* [b] *Centre for Healthcare Randomised Trials, University of Aberdeen, Health Sciences Building, Foresterhill, Aberdeen, UK;* [c] *Health Services Research Unit, University of Aberdeen, Health Sciences Building, Foresterhill, Aberdeen, UK;* [d] *Health Economics Research Unit, University of Aberdeen, Aberdeen, UK;* [e] *NHS Grampian, Department of Urology, Aberdeen Royal Infirmary, Aberdeen, UK;* [f] *Edinburgh Clinical Trials Unit, Usher Institute of Population Health Sciences & Informatics, University of Edinburgh, Edinburgh, UK;* [g] *Department of Urology, St Georges University Hospitals NHS Foundation Trust, London, UK;* [h] *Department of Urology, Norfolk and Norwich University Hospitals NHS Foundation Trust, Norwich, UK;* [i] *Stone Patient Advisory Group, Section of Endourology, British Association of Urological Surgeons, London, UK;* [j] *Bristol Urological Institute, North Bristol NHS Trust, Bristol, UK;* [k] *Academic Urology Unit, University of Aberdeen, Health Sciences Building, Foresterhill, Aberdeen, UK;* [l] *Nottingham Clinical Trials Unit, University of Nottingham, University Park, Nottingham, UK*

Waiting time in days from randomisation to treatment

Treatment Allocation	N	Median(IQR)	Range
EWSL (303)			
ESWL Pathway: treated	247	8 (2-18)	(0-415)
Treated as randomised	210	7 (2-15)	(0-79)
Switched treatment	37	25 (2-70)	(0-415)
Proportion treated within 8 weeks	229/247	(92.71%)	
URS (306)	.		
URS Pathway: treated	261	25 (9-44)	(0-269)
Treated as randomised	250	25 (9-44)	(0-269)
Switched treatment	12	22 (2-47)	(0-84)
Proportion treated within 8 weeks	225/261	(86.21%)	

Table 2: Primary outcome: Proportion requiring further intervention to clear the stone for SWL compared to URS

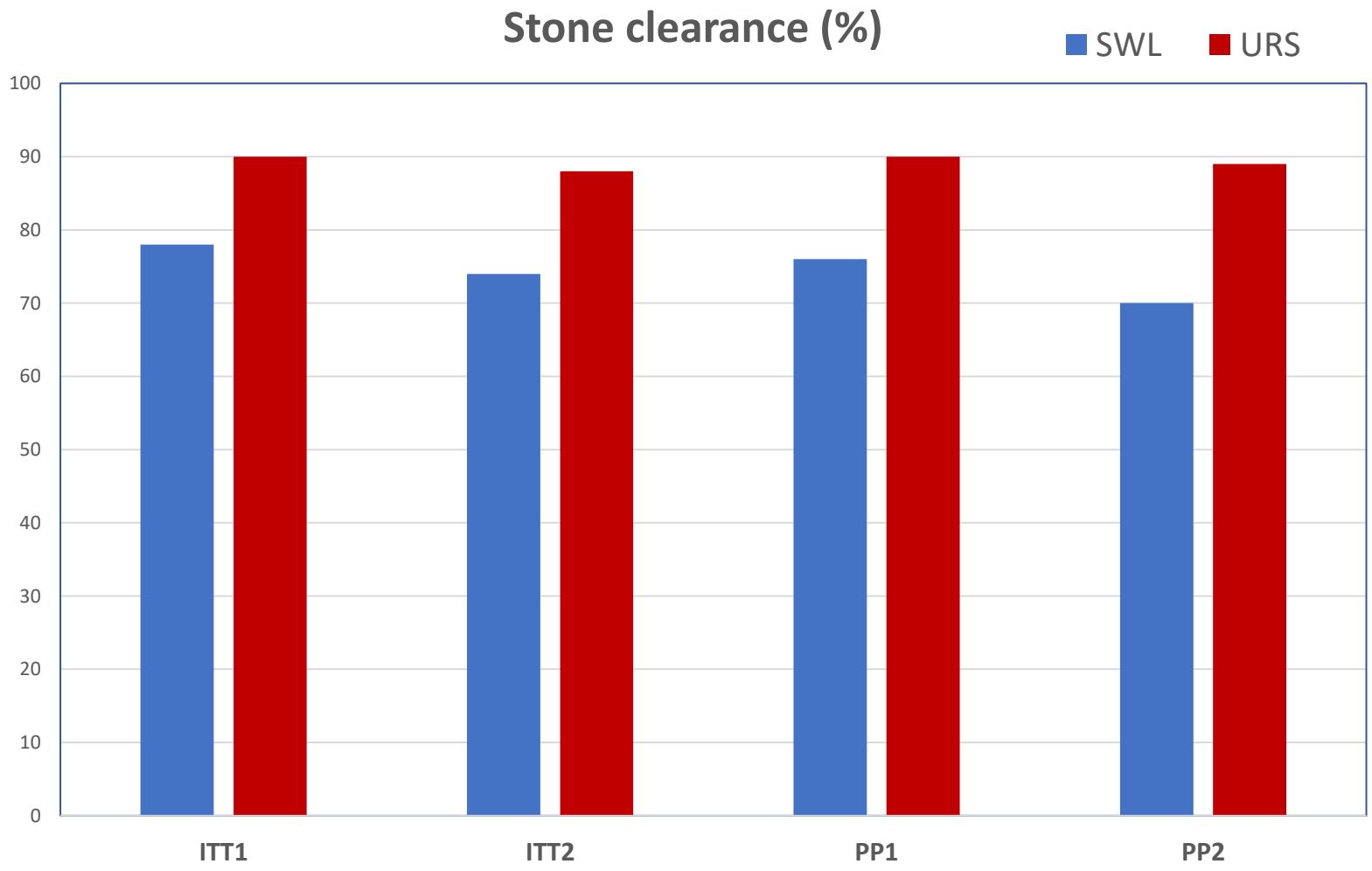
	SWL		URS						
Population	n/N	%	n/N	%	ARD[a,b]	95% CI	nonInf p-value	RR[a,b]	95% CI
ITT-1	67/302	22	31/302	10	0.12	(0.06, 0.18)	0.004	2.13	(1.37, 3.32)
ITT-2	65/250	26	31/266	12	0.14	(0.07, 0.21)	0.051	2.19	(1.41, 3.40)
PP - 1	64/262	24	27/283	10	0.15	(0.08, 0.21)	0.046	2.52	(1.60, 3.94)
PP - 2	62/210	30	27/247	11	0.18	(0.10, 0.26)	0.31	2.63	(1.67, 4.15)

ARD absolute risk difference (SWL – URS); RR relative risk (URS is the reference category); ITT-1 Intention to treat including all participants; ITT-2 intention to treat but excluding those who passed their stone prior to any intervention. PP-1 per protocol including those that passed their stone before treatment; PP-2 per protocol analysis excluding those that passed their stone before treatment.

nonInf p-value: non-inferiority p-value for the ARD results only: Ho: SWL is inferior to URS

[a] All treatment effect estimates adjusted for outcome at baseline, stone size, stone location, age, gender and centre

[b] Modified Poisson regression model with a log-link function and robust error variance


Stone clearance (%)
SWL
URS
100
90
80
70
60
50
40
30
20
10
0
ITT1
ITT2
PP1
PP2

Message

Tamsulosin 400mcg daily for distal ureteric stones
- no evidence better than placebo in SUSPEND
- some meta-analyses suggest benefit

Shockwave Lithotripsy almost as effective as Ureteroscopy&Laser

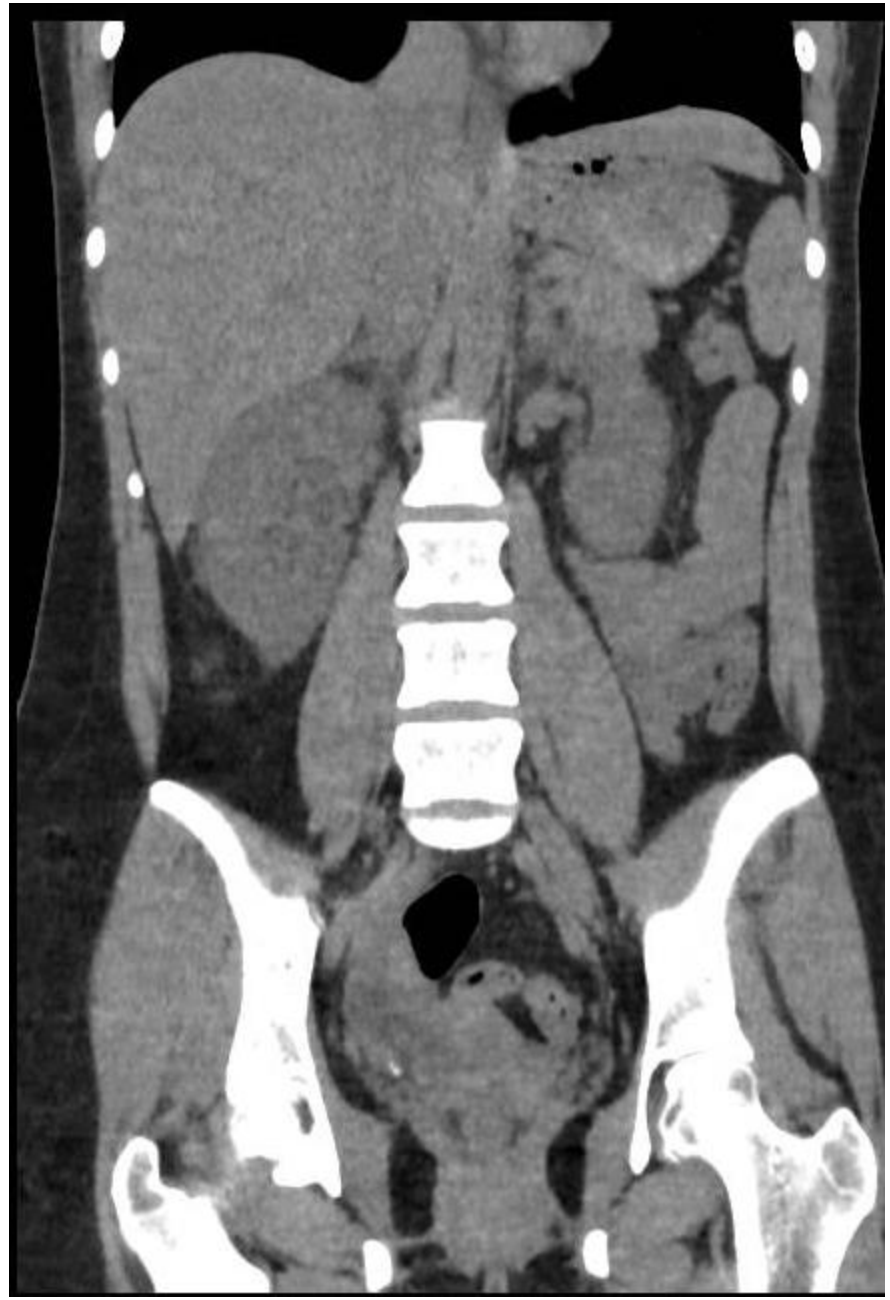
Stents

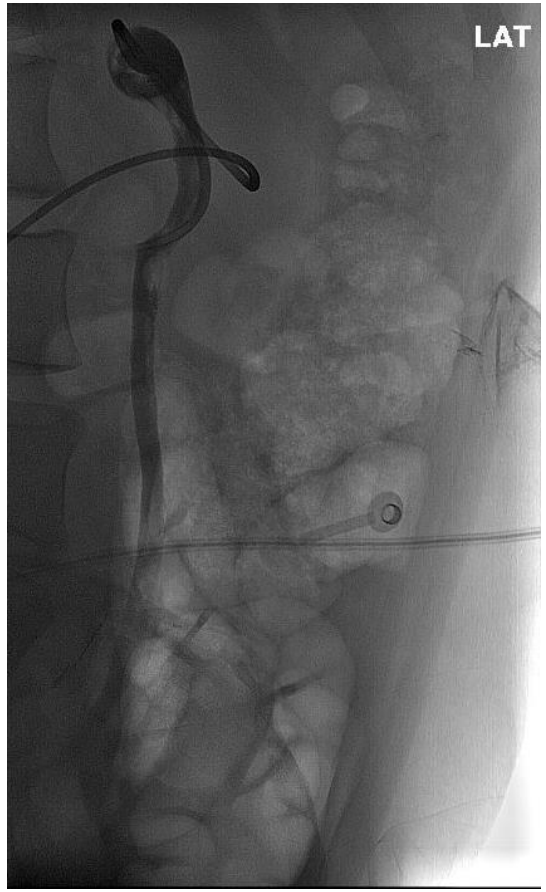

L

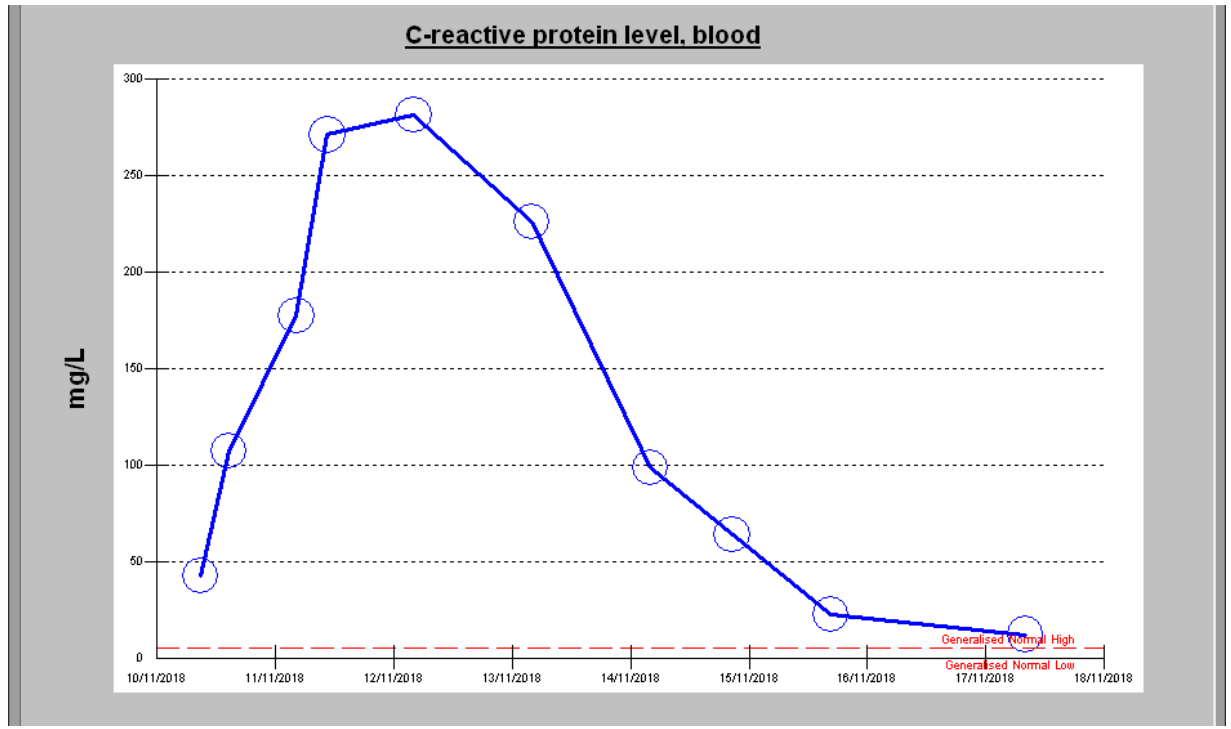
27 year old female management consultant

Presented with right renal colic (during work trip to Beijing)
Had analgesia
Flew back to UK

Pyrexial
CRP 170



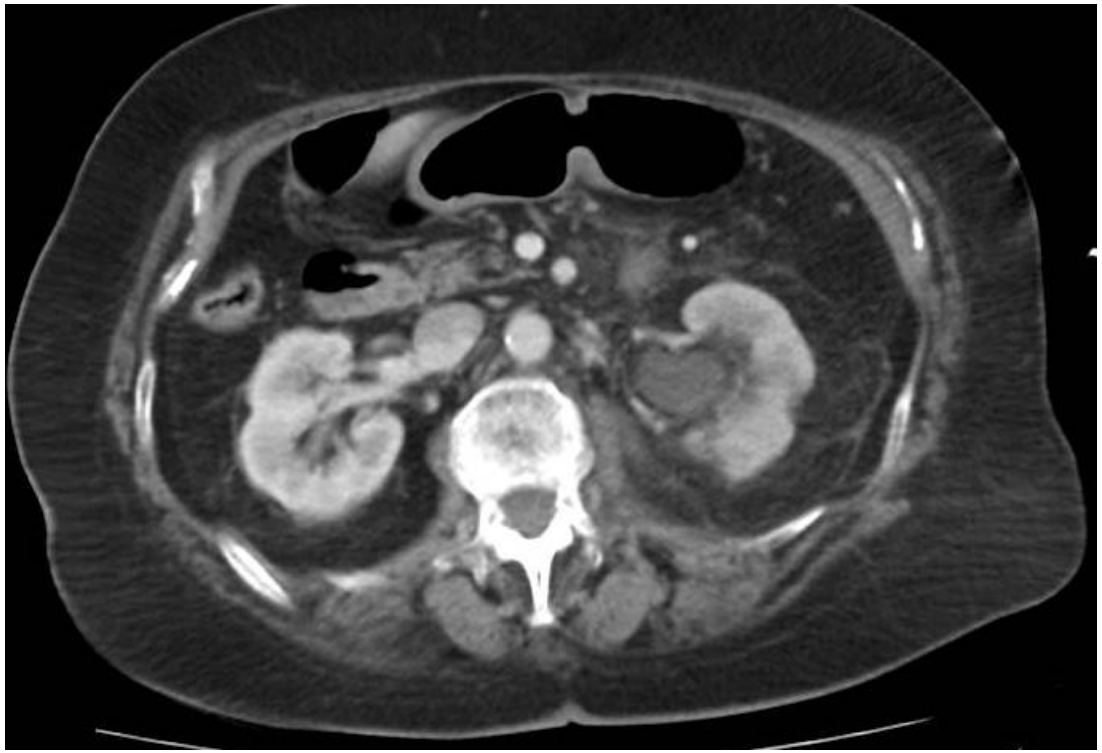

LAT

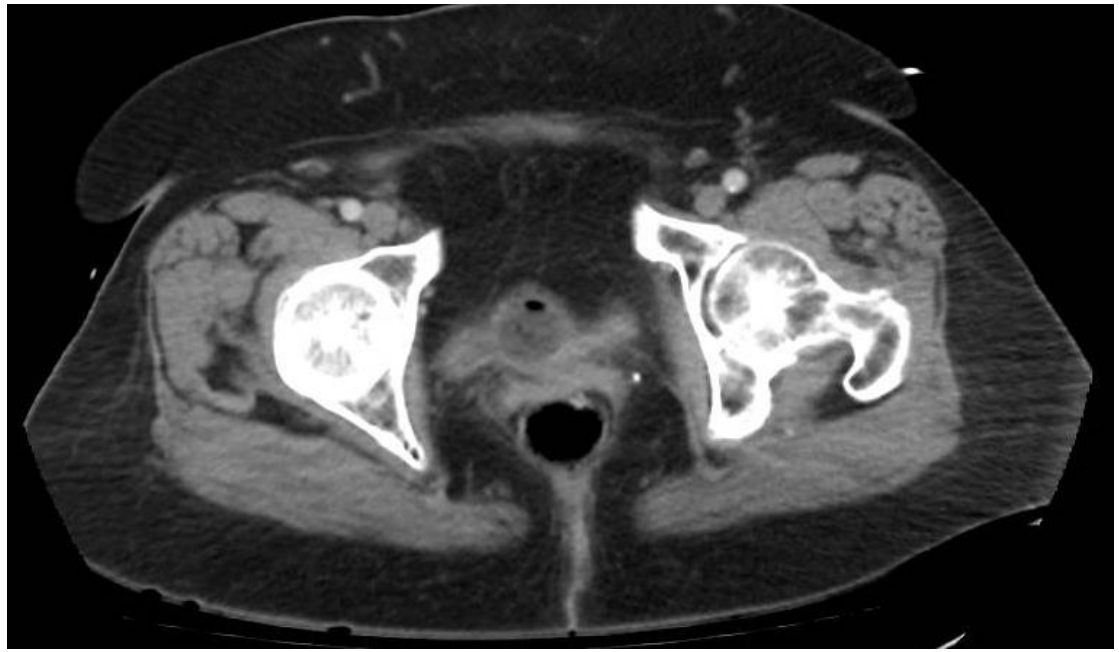

C-reactive protein level, blood
mg/L
300
250
200
150
100
50
0
10/11/2018
11/11/2018
12/11/2018
13/11/2018
14/11/2018
15/11/2018
16/11/2018
17/11/2018
18/11/2018
Generalised Normal High
Generalised Normal Low


RT

81 year old

Referred from local hospital
CT suggested obstructed left urinary tract
4-5mm distal left ureteric stone



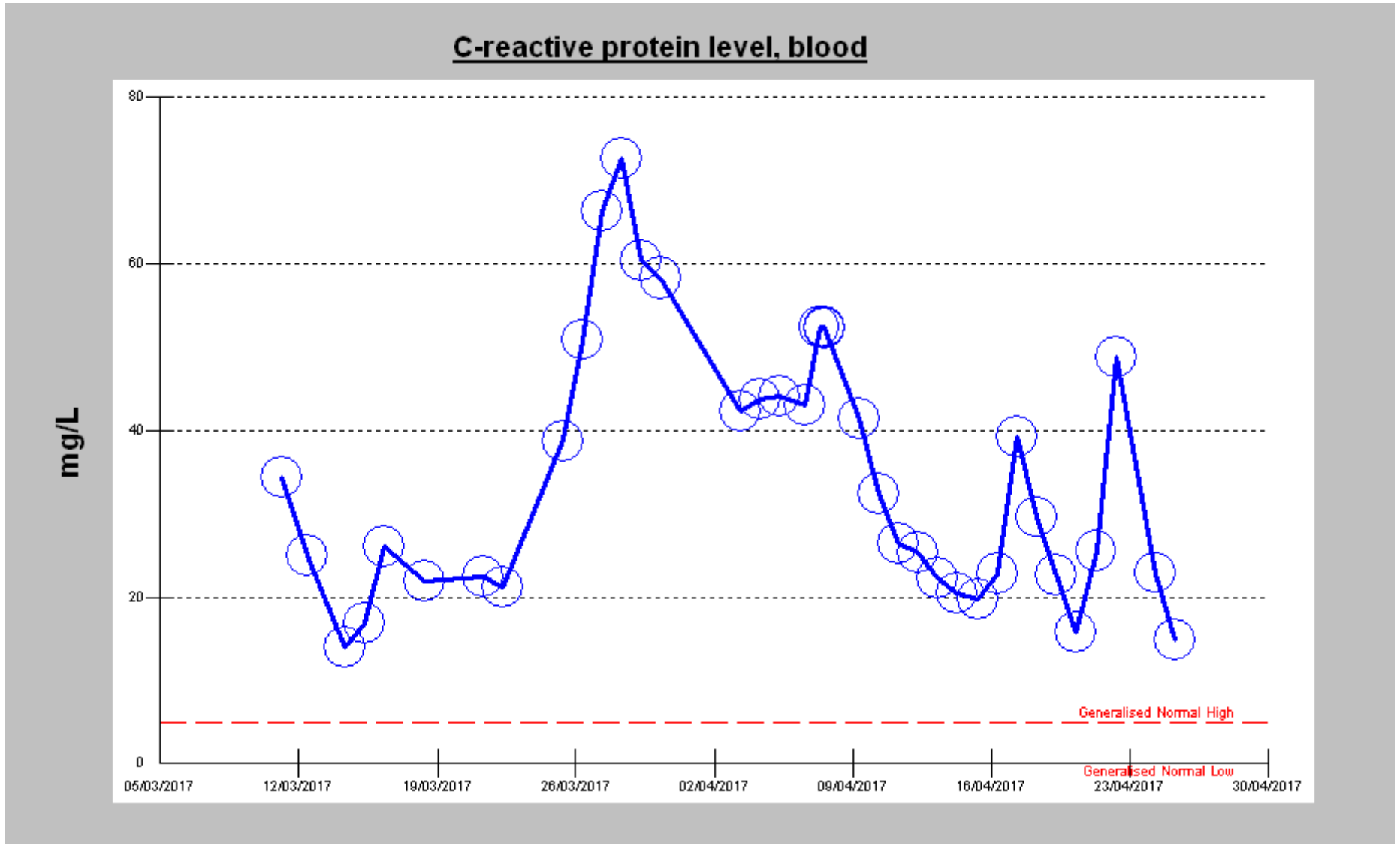


81 year old

Referred from local hospital
CT suggested obstructed left urinary tract
4-5mm distal left ureteric stone

Management?
Nephrostomy vs Stent


LT


C-reactive protein level, blood
mg/L
80
60
40
20
0
Generalised Normal High
Generalised Normal Low
05/03/2017
12/03/2017
19/03/2017
26/03/2017
02/04/2017
09/04/2017
16/04/2017
23/04/2017
30/04/2017

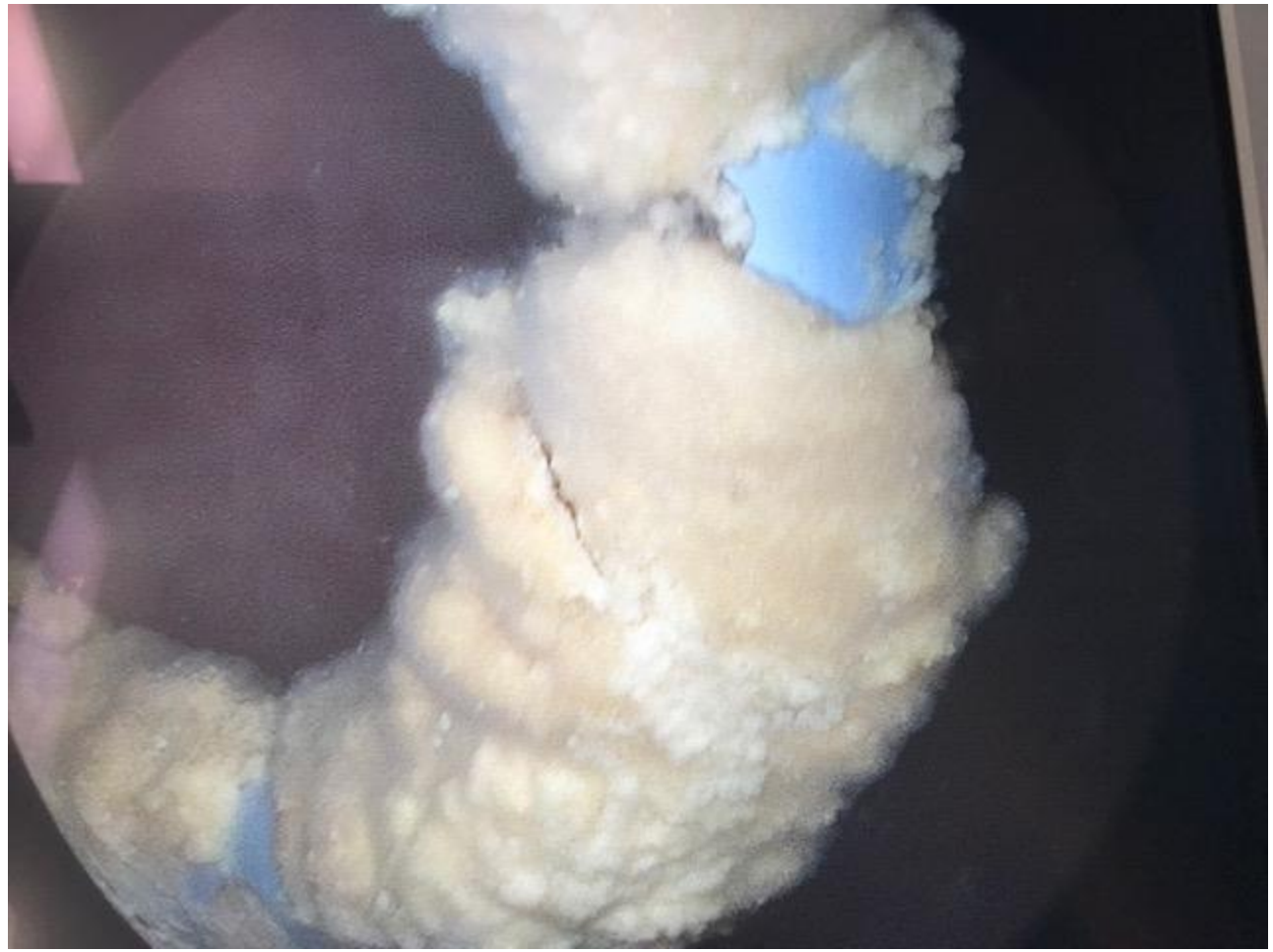
81 year old

Referred from local hospital
CT suggested obstructed left urinary tract
4-5mm distal left ureteric stone

Management?
Nephrostomy


20:08:56

Data Item	National Figures		Charing Cross Hospital, London	
CT KUB performed within 24 hours of presentation (NICE)	91% (1980/2175)		96.43% (27/28)	
Temporising stent insertion % of active Mx cases (excl UTI)	200/504	39.7%	2/7	28.57%
Primary SWL % of active Mx cases (excl UTI)	172/504	34.1%	2/7	28.57%
Primary Ureteroscopy % of active Mx cases (excl UTI)	116/504	23.0%	3 /7	42.86%
Primary URS/SWL done within 48 hours	116/283	41.0%	2/5	40%



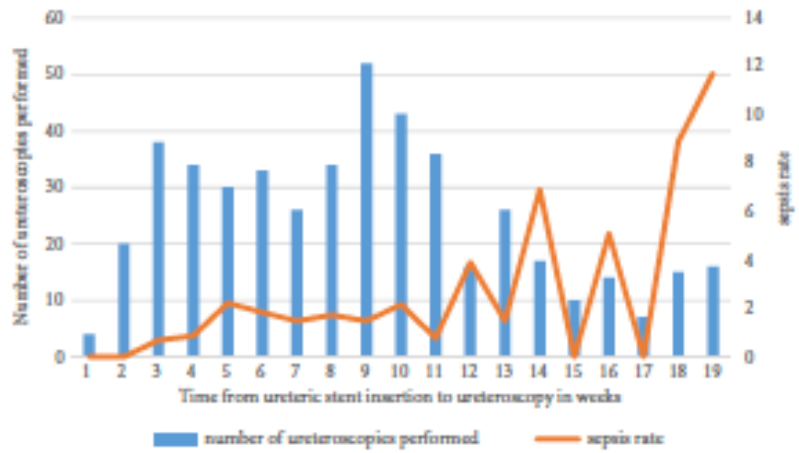
BJUI
BJU International

Ureteric stent dwelling time: a risk factor for post-ureteroscopy sepsis

Amihay Nevo*†, Roy Mano*†, Jack Baniel*† and David A. Lifshitz*†

*Department of Urology, Rabin Medical Centre, Petach Tikva, Israel, and †Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

Fig. 1 Sepsis rate by stent dwelling time. The horizontal axis represents dwelling time in weekly intervals. Bars represent the number of ureteroscopies performed at each interval; the line indicates sepsis rate at the corresponding interval.



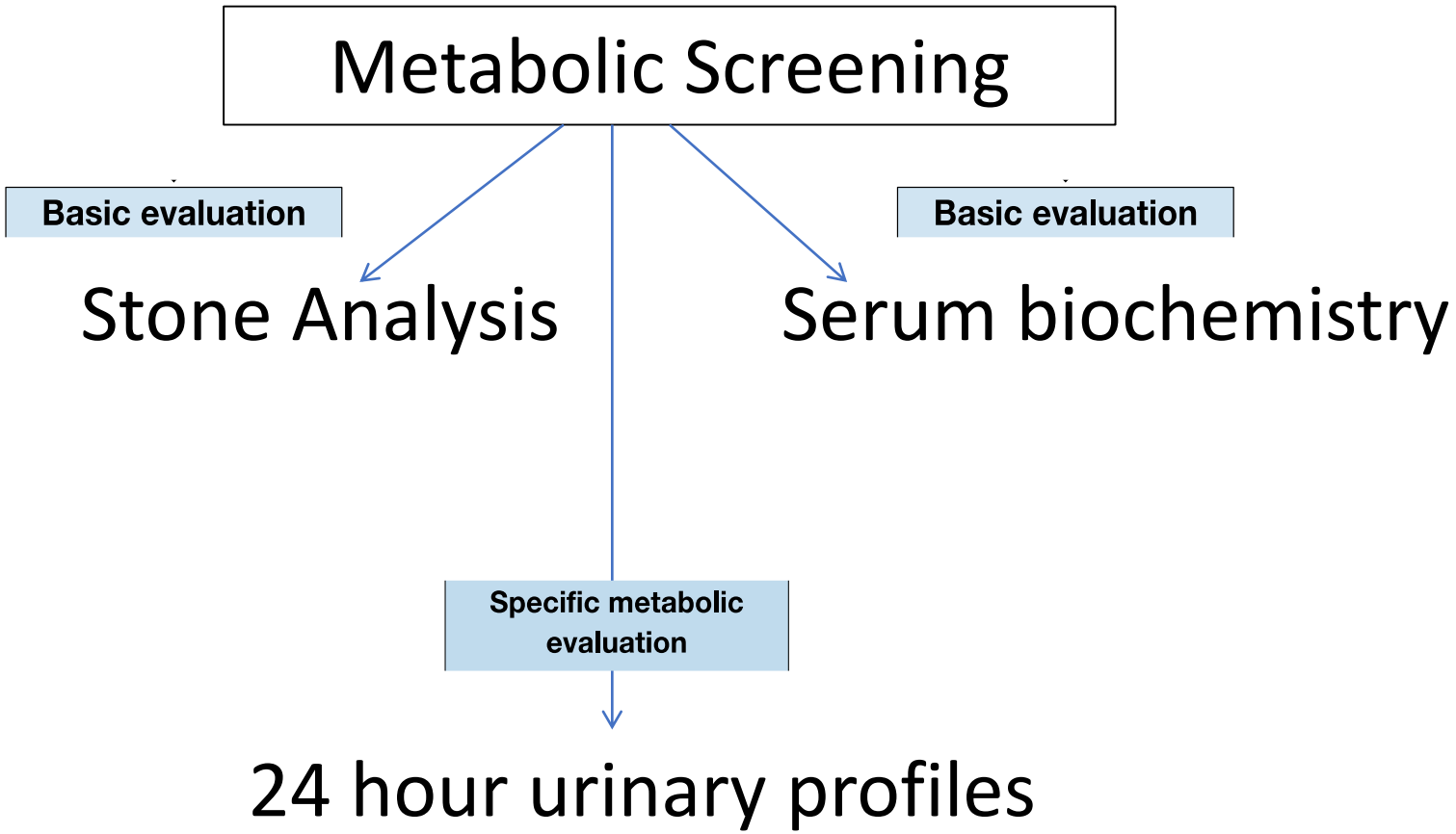
Message

Infected obstructed kidney = EMERGENCY

Stent vs Nephrostomy

Stent morbidity

Metabolic testing


Metabolic Screening
Basic evaluation
Basic evaluation
Stone Analysis
Serum biochemistry
Specific metabolic evaluation
24 hour urinary profiles

Adequacy of a Single 24-Hour Urine Collection for Metabolic Evaluation of Recurrent Nephrolithiasis

Scott M. Castle, Matthew R. Cooperberg,* Natalia Sadetsky, Brian H. Eisner† and Marshall L. Stoller‡,§

From the Department of Urology, University of California-San Francisco, San Francisco, California

Table 1. *First and repeat 24-hour urine samples in 777 patients*

24-Hr Urinary Parameter	Mean Sample 1	Mean Sample 2	p Value (pairwise t test)	95% CI
Calcium (mg)	209.9	205.2	0.44	201.4–218.3
Oxalate (mg)	42.1	40.4	0.06	40.8–40.3
Citrate (mg)	562.6	559.8	0.87	537.8–587.4
Uric acid (gm)	0.7	0.7	0.32	0.68–0.72
Sodium (mmol)	173.2	167.5	0.14	167.7–178.7
Potassium (mmol)	67.3	66.7	0.69	65.3–69.4
Magnesium (mg)	107.3	105	0.3	104.2–110.5
Phosphorus (gm)	0.97	0.96	0.49	0.95–1.00
Ammonium (mmol)	39.7	39.3	0.65	38.4–40.9
Chloride (mmol)	167.8	162.7	0.18	162.5–173.1
Urine urea nitrogen (gm)	11.5	11.2	0.19	11.2–11.8
Creatinine (mg)	1,551	1,542	0.74	1,513–1,588

0022-5347/10/1842-0579/0
THE JOURNAL OF UROLOGY®

Vol. 184, 579-583, August 2010
Printed in U.S.A.
DOI:10.1016/j.juro.2010.03.129

The value of repeating a test: Metabolic profiles

Saskia Verhagen, Jeremy Cox, Ranan DasGupta
St Mary's Hospital, Imperial College NHS Healthcare Trust, London, UK

World Congress of Endourology
MP1B-03

INTRODUCTION AND OBJECTIVES:

The use of 24 hour urinary metabolic profile testing is accepted as part of the investigation of underlying causes for renal stone formation. Typically this will include an acidic and a non-acidic sample for a full profile. In conjunction with serum biochemistry and stone analysis, the results are then generally used to guide dietary modifications.

However, it is unclear how accurate such a 'snapshot' result is, especially in the context of diet, and how frequently one should consider repeating this, in order to limit the inherent variability.

We aim to review the urinary biochemistry in patients presenting through our metabolic unit.

METHODS:

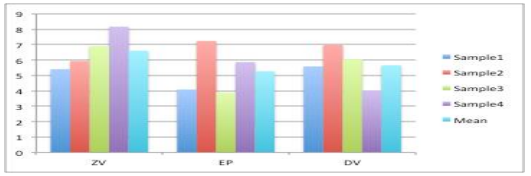
Over a 2 year period we reviewed all recurrent stone formers who underwent a 24 hour urinary collection. We recorded the serum and urinary biochemistry, with the aim of recording variability of urinary calcium, oxalate, phosphate, urate, and how this differed after an interval period.

RESULTS:

From a total of 140 patients, a total of 46% had a repeat 24 hour urine profile at some stage. 23 patients had 3 or more urine collections performed; of these, 3 were persistently hypercalciuric, and 1 persistently hyperoxaluric; none were persistently hyperuricosuric, with no change in medication. There was little difference in pick-up rate between samples 2 and 3.

Figure 1

Example of 3 patients with upto 4 samples of 24 urine profiles, with urinary calcium levels (mmol/l) illustrated, alongside the mean sample value.



CONCLUSIONS:

Although a 24hour urine sample aims to offer a perspective of the urinary milieu across a time period, it is still nevertheless a 'snapshot', with multiple factors (including recent diet, etc) affecting the results. The role of a 2nd reading may improve the pick-up rate of abnormalities, but there appears limited advantage in checking them for a 3rd time in the absence of any dietary changes.

The dietary modifications recommended on the basis of a 24 hour urinary collection should be considered in the context of whether the metabolic profile should be repeated. While it would be useful to have an HbA1C-style static representation of dynamic results, until this is available it seems reasonable to repeat the profile, for accurate interpretation of the results.

Message

Serum tests: UE/ Ca/ urate/ Vit D/ PTH

Urinary tests: 24 hr urine tests