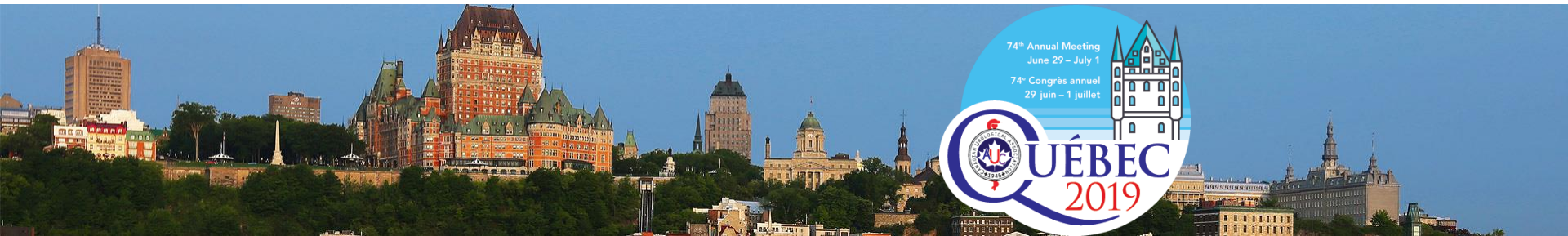


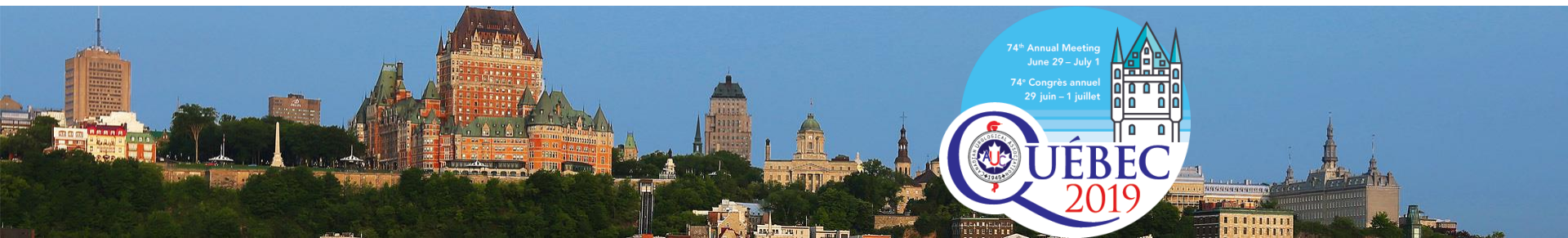
HOW TO TREAT THE STONES YOU DON'T WANT TO TREAT

CUA 2019
June 29, 2019



Goals

- Case-based presentation of challenging stones cases
- Practical tips and tricks
- How to stay out of trouble
- How to get out of trouble



Expert Faculty



Mitch Humphreys

Chair and Professor, Department of Urology
Mayo Clinic, Phoenix, Arizona



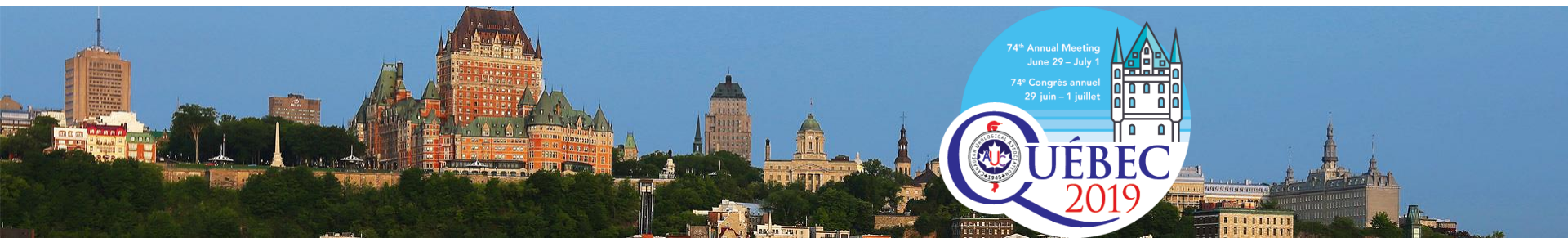
Trevor Schuler

Division Chair, Urology, Department of Surgery
Division of Urology
University of Alberta

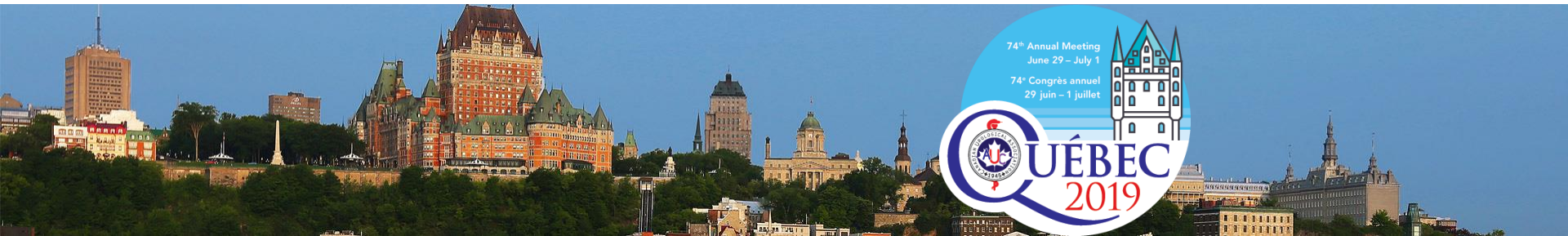


Michael Kogon, MD, FRCSC

Chief, Division of Urology
Mackenzie Health, Richmond Hill, Ontario

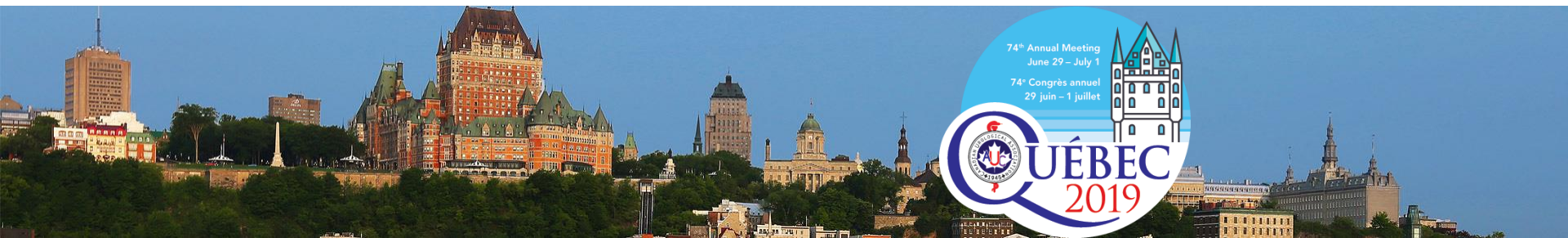


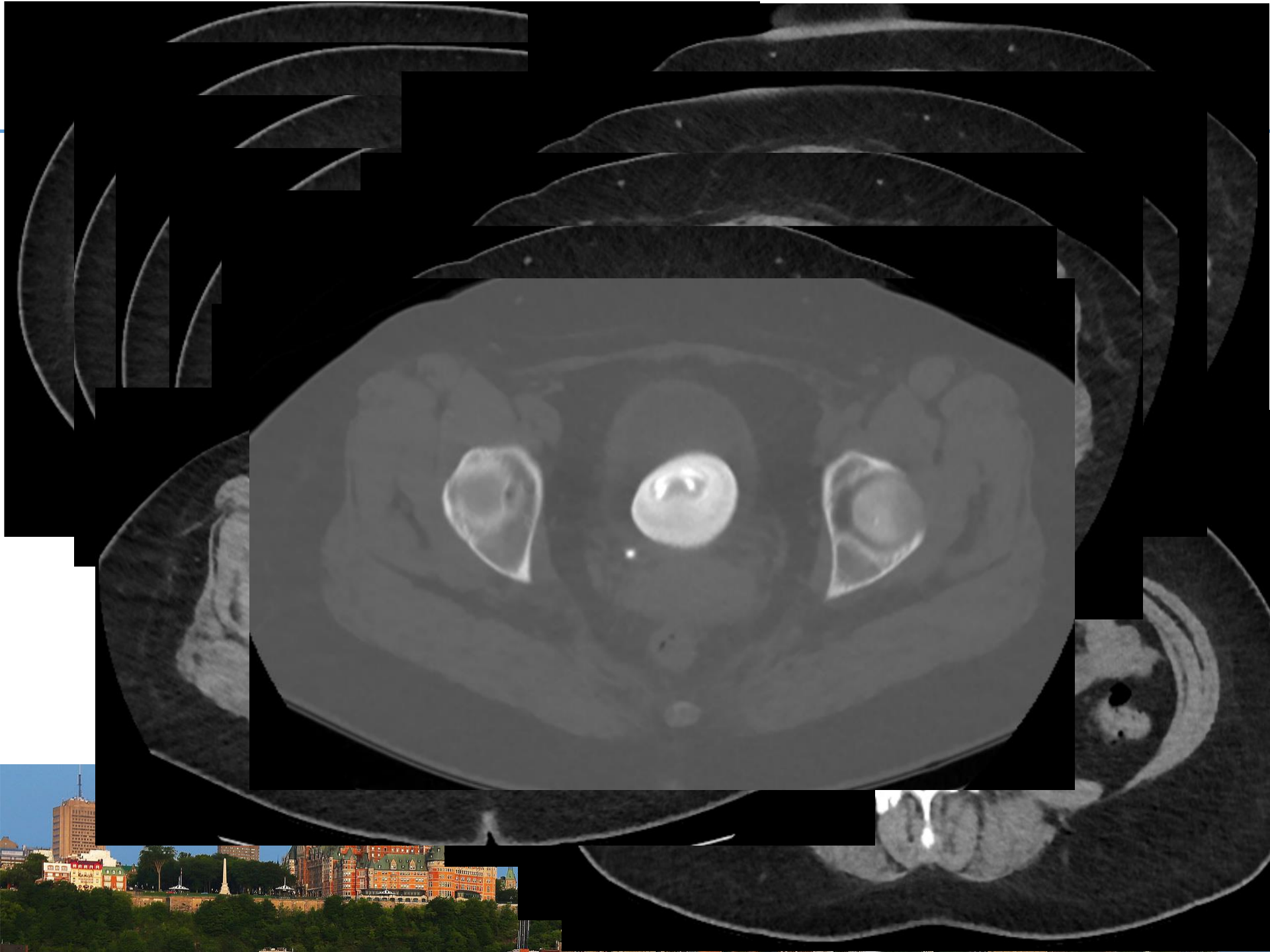
CASE PRESENTATIONS

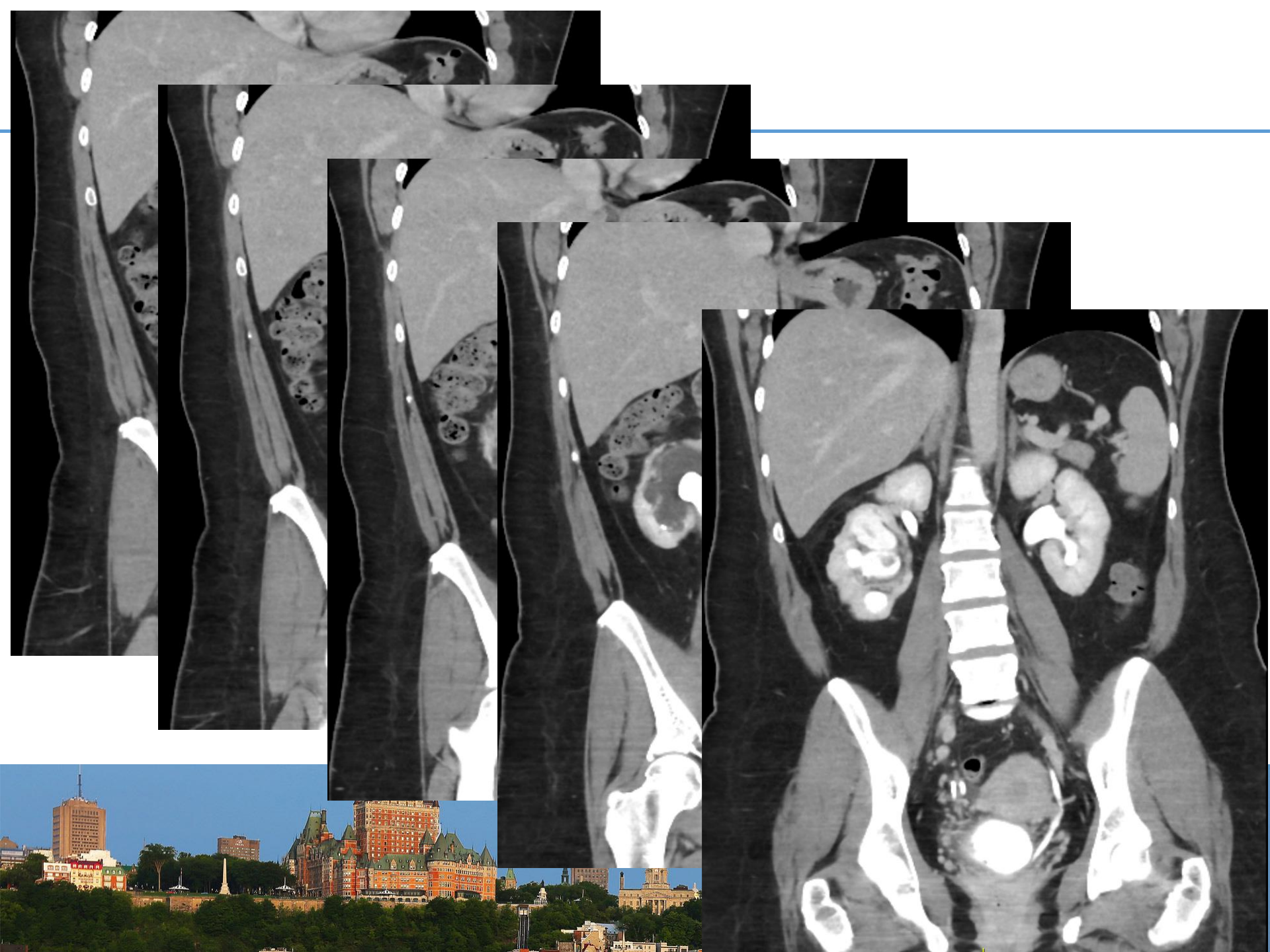


Case #1

- 34 yo Female
- First stone episode in 2008
- 7-8 stone events since that time and multiple procedures
- SA: 70% Ca Phos, 20% Struvite, 10% Ca Carbonate
- Had a stent place on Oct 2016 for a right distal stone
- PMH: HTN



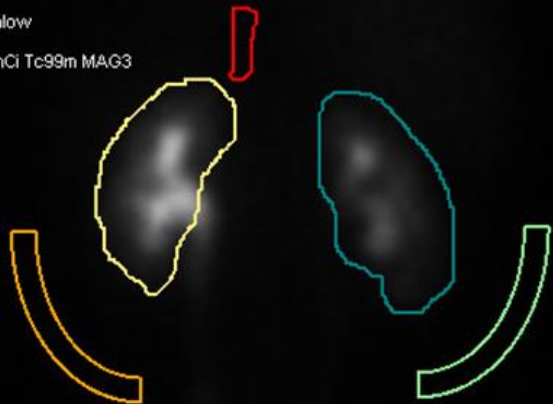




Cine FLOW POST

FLOW POST
BrightView

REF: Critchlow
TECH: JTG
DOSE: 10 mCi Tc99m MAG3



Dose=DuCi

LT POST RT

[8/31]

Results

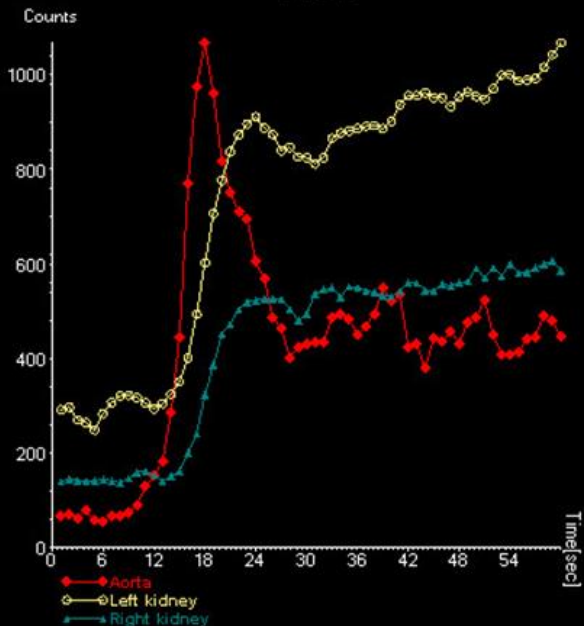
Simple renogram

	Left kidney	Right kidney
Peak time (min)	6.00	6.00
T1/2 (min)	17.00	122.85
Peak counts	110537.80	58391.55
Diff perfusion (%)	63.95	36.05
Renal retention (%)	56.91	88.62

Radionuclide	TC-99M
Radiopharmaceutical	10 mCi Tc Mag3
Differential calculation time (min)	2 - 3
Time of Lasix injection (min)	-
Residual activity time (min)	20.00
Depth (cm)	0.00

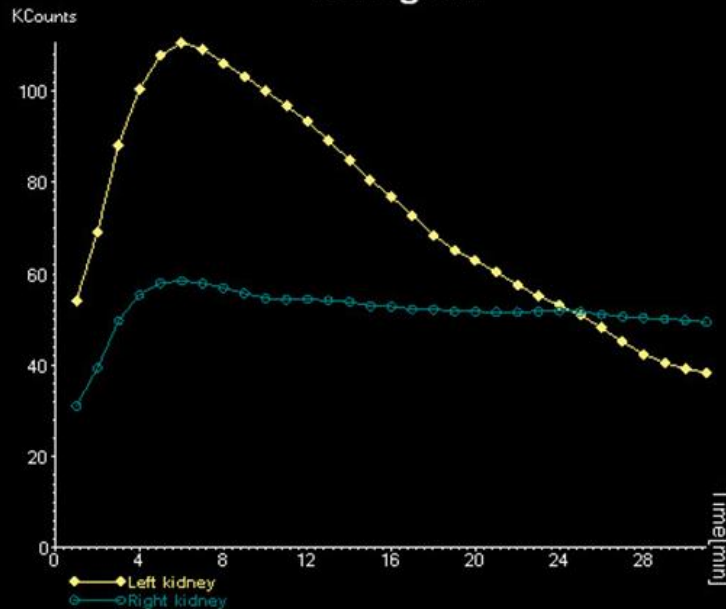
Flow

Flow



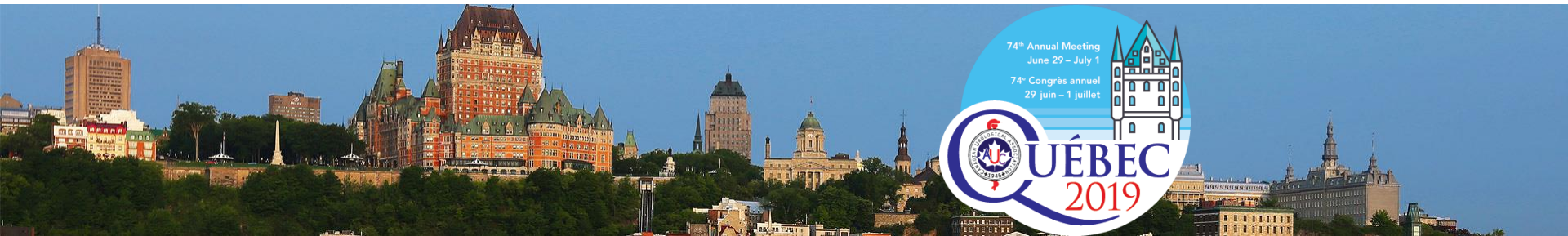
Renogram

Renogram

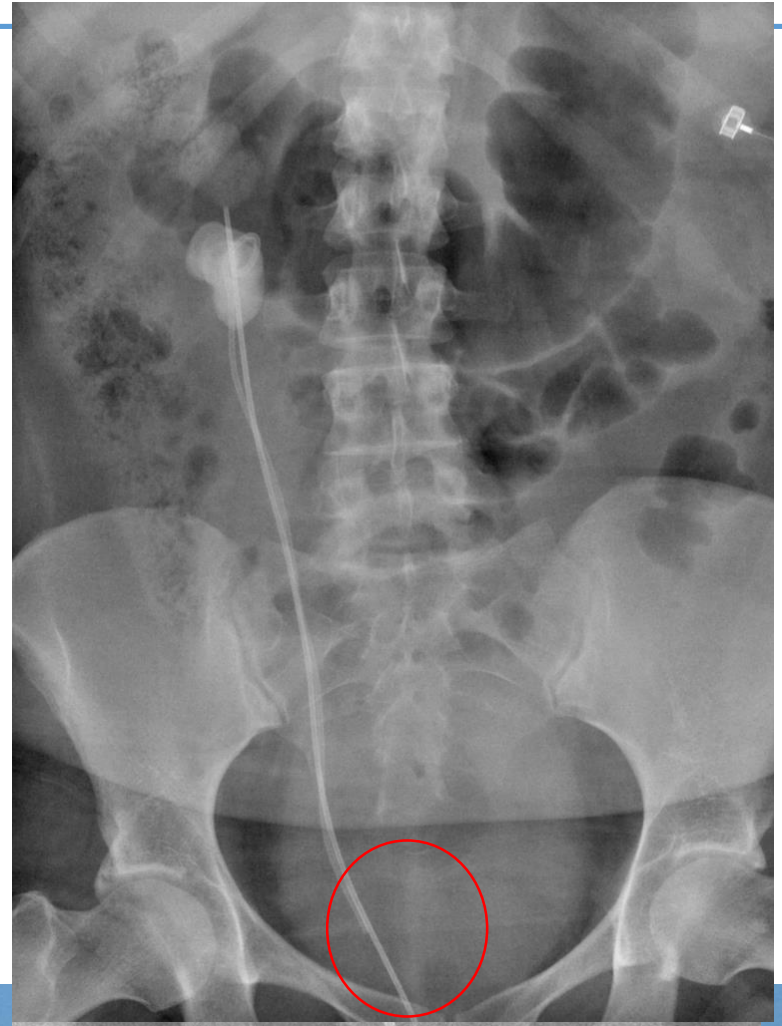


Labs

- Cr 0.82 mg/dL, eGFR > 90 mL/min/BSA
- Hgb 10.7 g/dL, WBC 9.2
- UA: Negative (just finished a course of cipro)

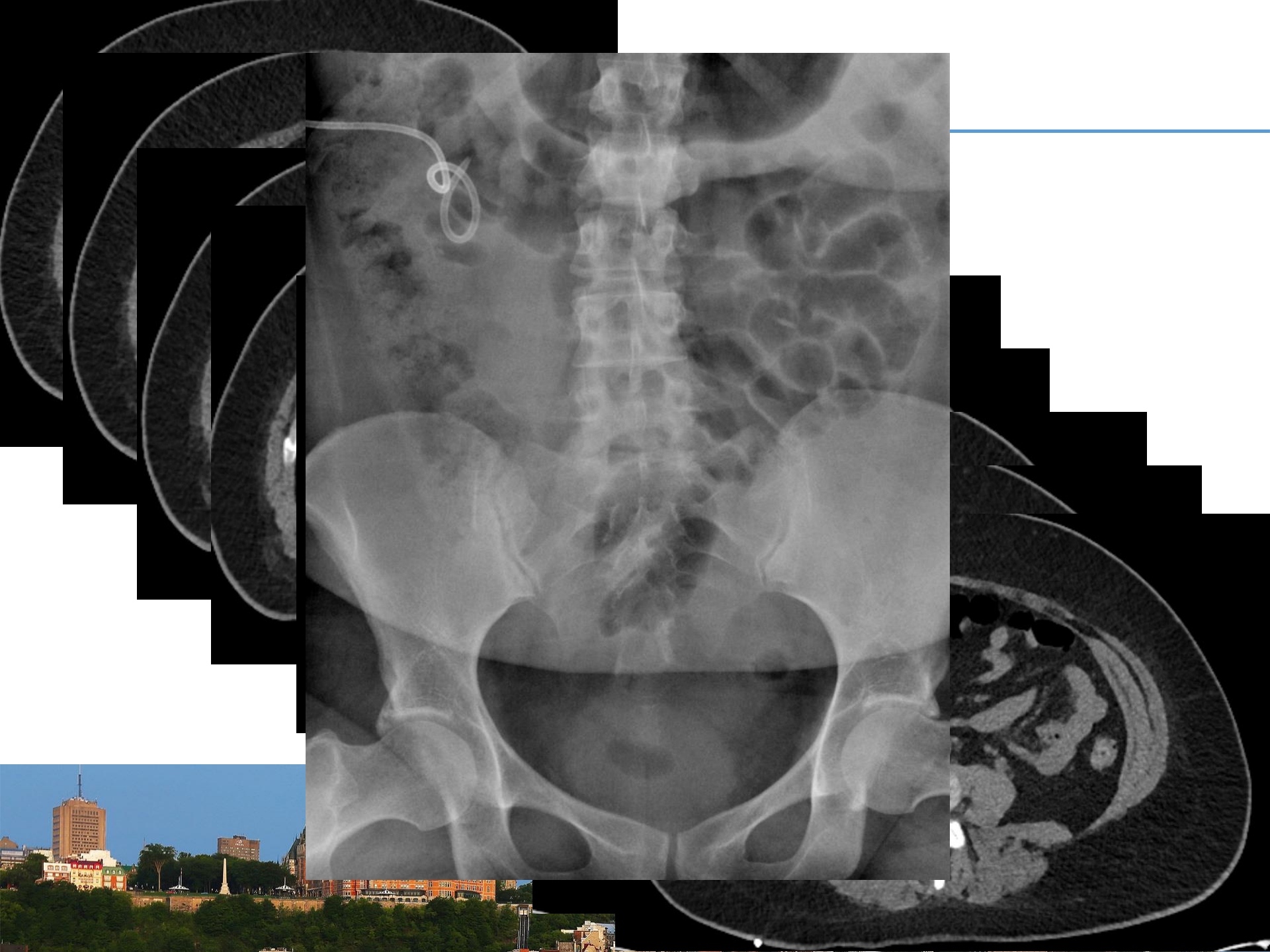


Treatment

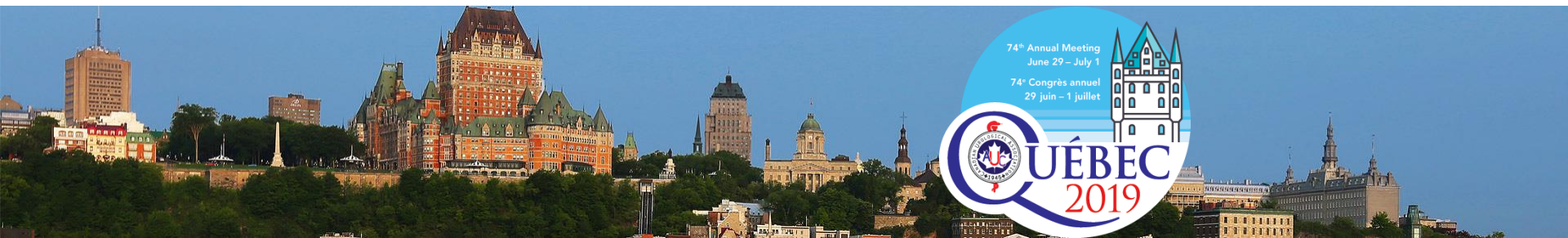


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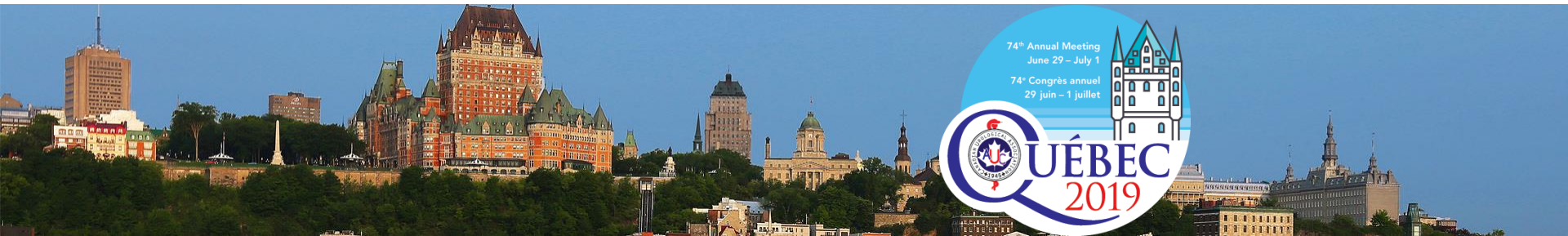


- SA (bladder): 70% Ca phosphate, 20% struvite, 10% Ca carbonate
- SA (kidney): 90% Ca Phosphate, 10% Ca Carbonate
- Stone culture: mixed gram pos and neg (susceptibilities not performed)
- Cr 0.71 mg/dL



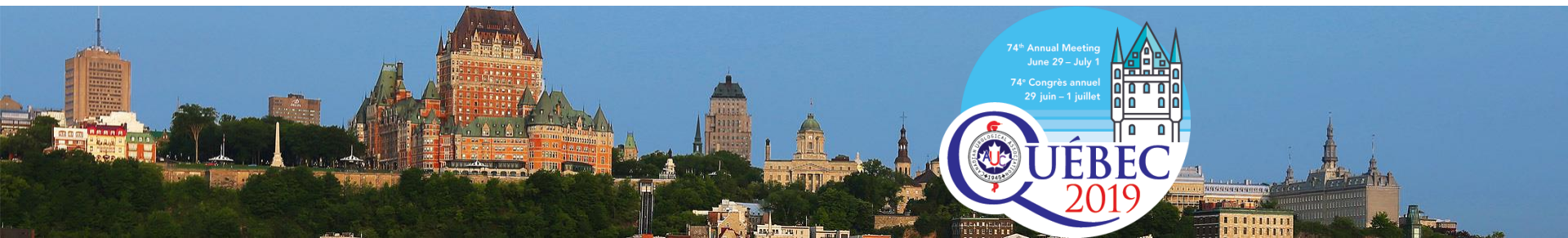
Prevention?

- Stent with tether
- Stent registry
- Stent tracking software
- Stent “book”

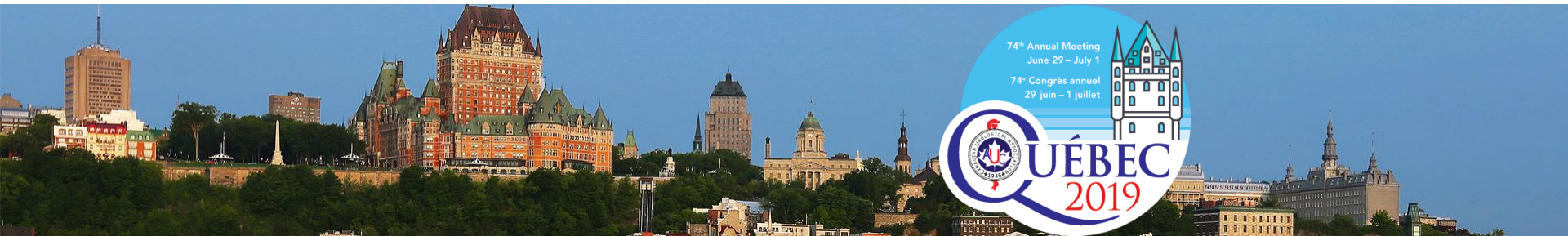
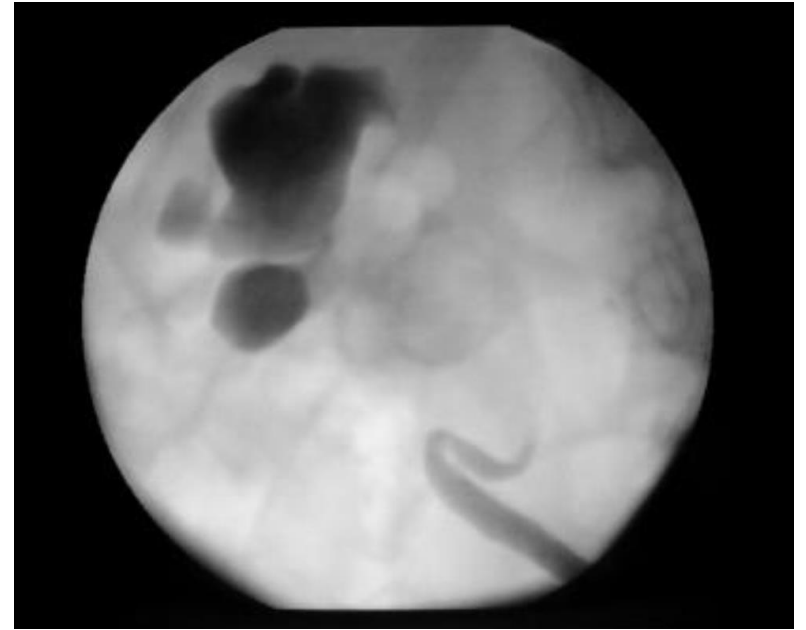


Case #2

- 55yo woman presents with right renal colic
- 7mm RUU radiolucent stone with moderate hydronephrosis on CT, with no other stones
- BMI 35, DM2, OSA with CPAP, HTN
- Opts for right ureteroscopy

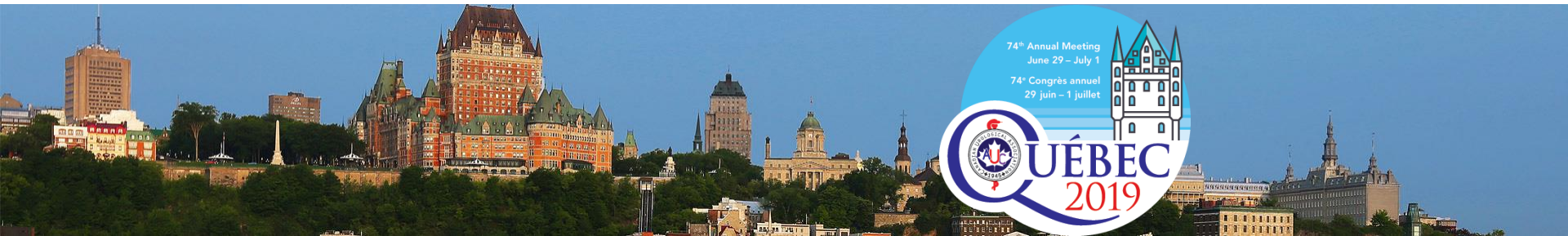


Retrograde



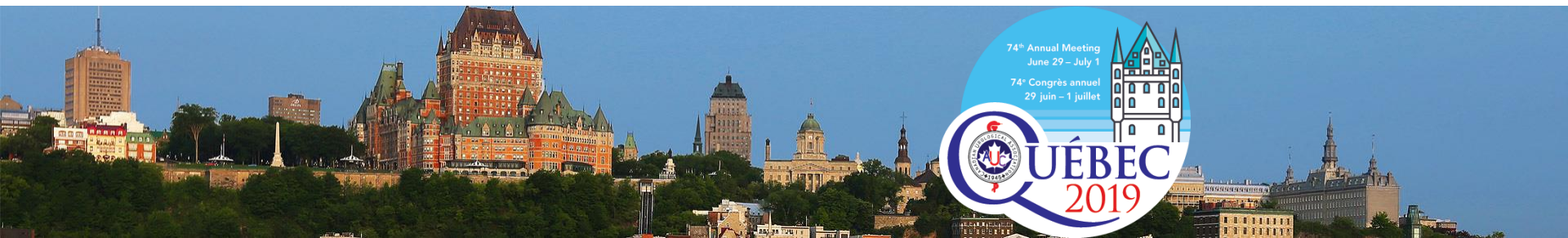
Approach?

- Contrast bypasses stone, but quite tortuous ureter below stone
- Strategies? Approach?



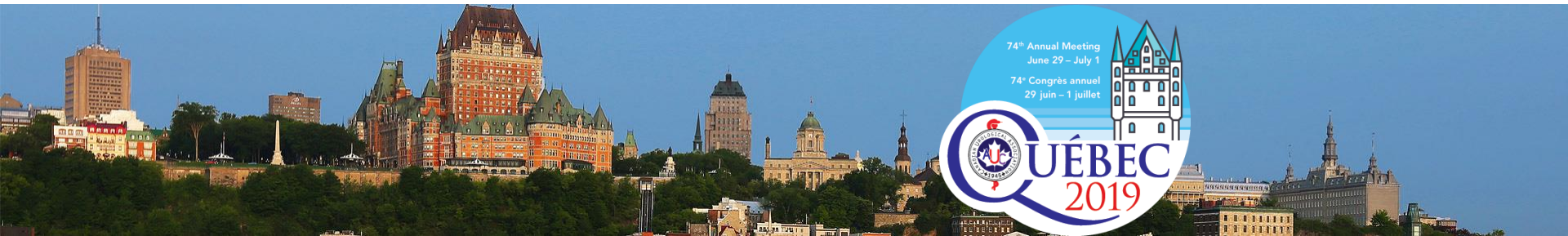
What next?

- Bentson wire: no luck
- Able to get curved hybrid wire into kidney
- Does not straighten ureter much
- Cannot get ureteral catheter past stone
- Look up with flexible ureteroscope: cannot see around kink in ureter



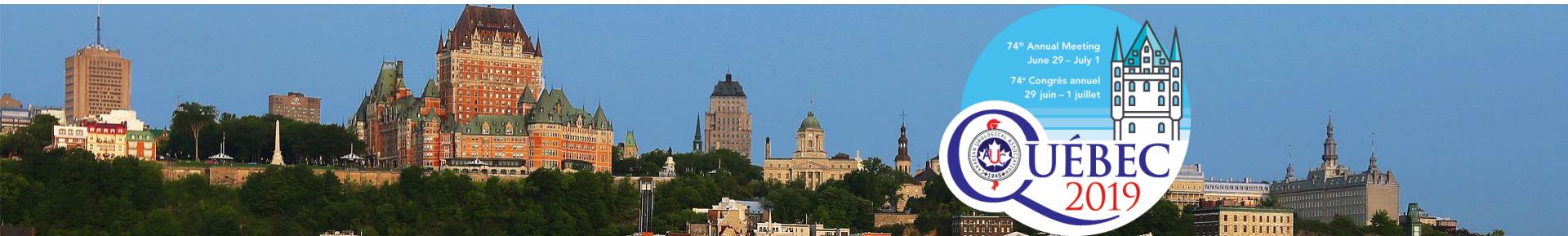
Fight another day

- Unable to place stent (won't advance past stone even with access sheath below kink)
- Abort procedure
- Right perc nephrostomy
- What now?



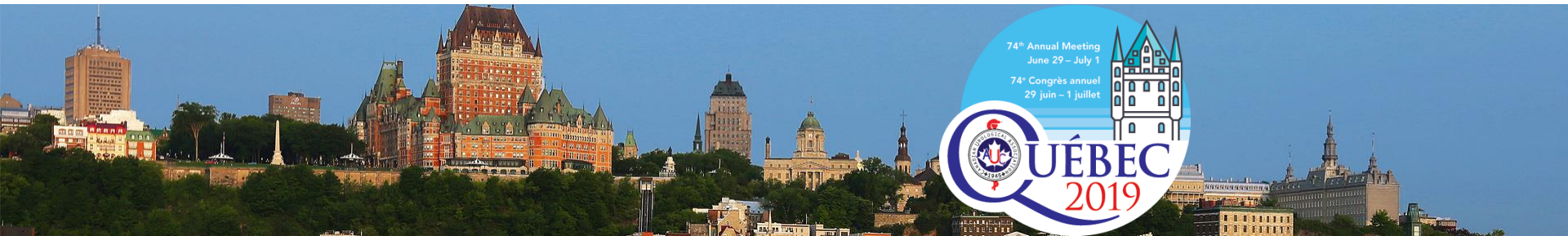
Options

- Attempt placement of nephroureterostomy tube and then perform retrograde ureteroscopy
- Perform antegrade access and antegrade ureteroscopy
- Open/lap/robotic ureterolithotomy



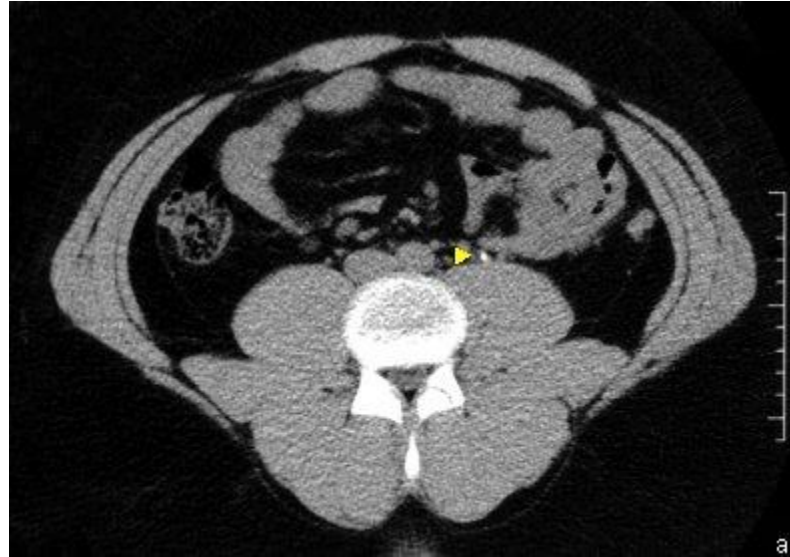
Take home points

- It is OK to abandon URS rather than cause harm
- Prefer to stent if possible

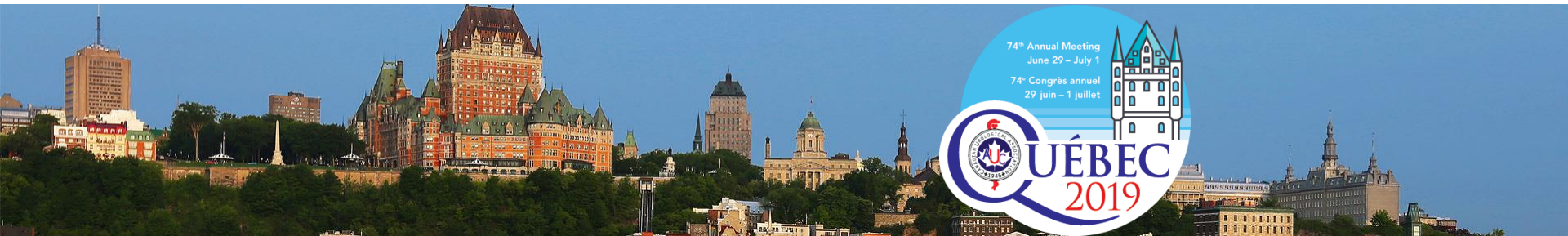


Case #3

- 37yo ER nurse presents with left renal colic

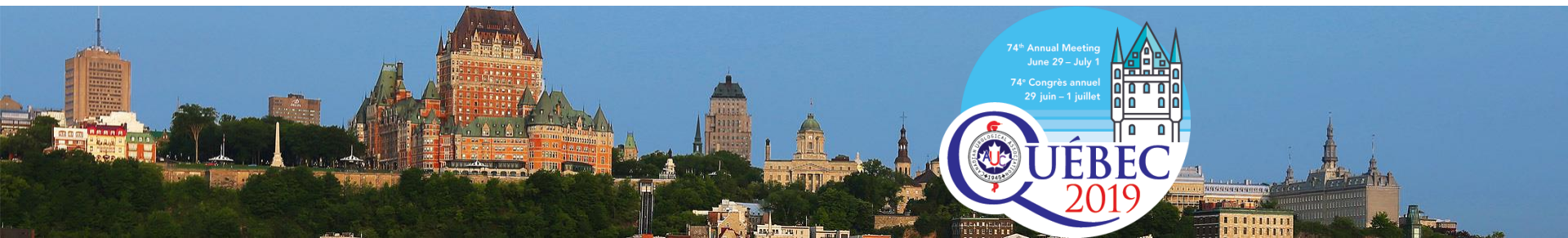


3mm LUU stone with mild hydro



Case #3

- Pain settles, discharged home
- Seen in clinic two weeks later with persistent moderate hydronephrosis on US, stone still present
 - Patient asymptomatic
- Pt otherwise well, had XRT for lymphoma 5 years ago
- Plan?



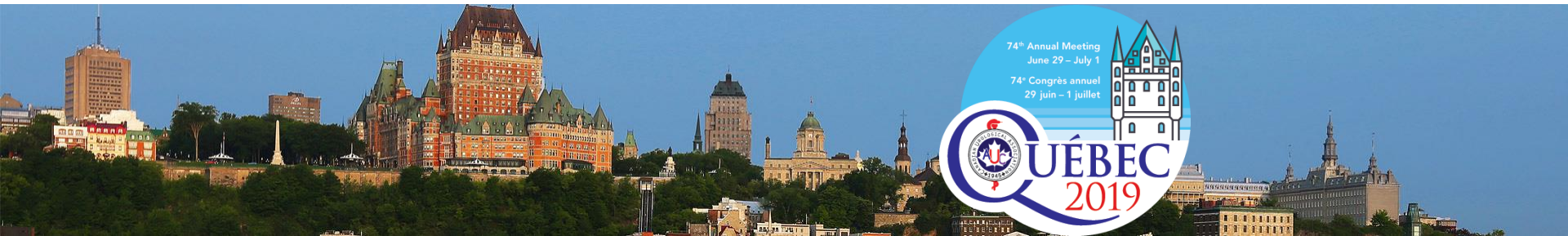
Left ureteroscopy

- During left ureteroscopy ureter very narrow in caliber
- Able to advance 6.7F semirigid ureteroscope only 2-3 cm
- Now what?



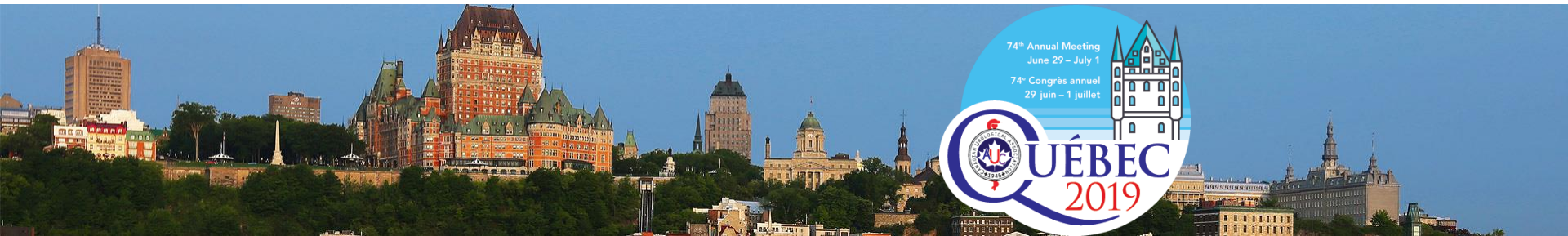
Left ureteroscopy

- 4.5F pediatric ureteroscope also cannot pass
- Retrograde: no specific stricture, narrow caliber ureter
- Calibrate ureter with inner cannula of 9.5/11F access sheath: resistance
- Now what?



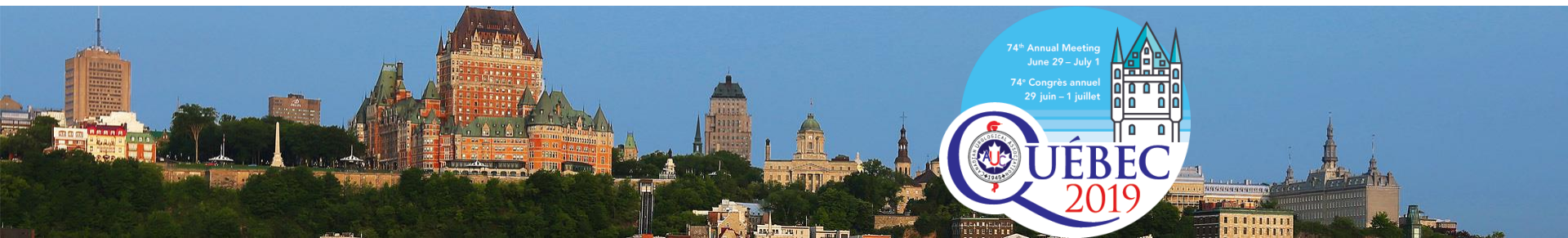
Fight another day

- Place ureteric stent (no tether)
- Abort procedure
- Return for URS in two weeks after passive dilation



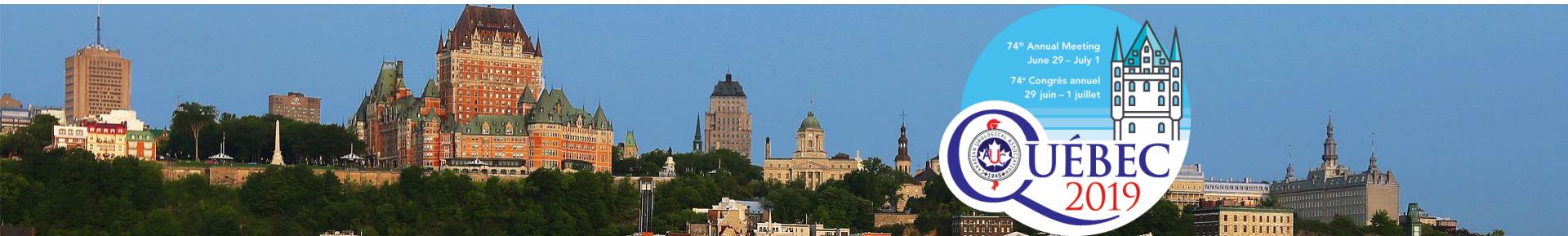
History

- Urologic:
 - BPH, strictures, reimplants, radiation
- Anesthetic:
 - OSA, obesity, etc.
- Bleeding:
 - ASA, NSAIDS, antiplatelet agents
 - NOACs
 - Coumadin, heparin



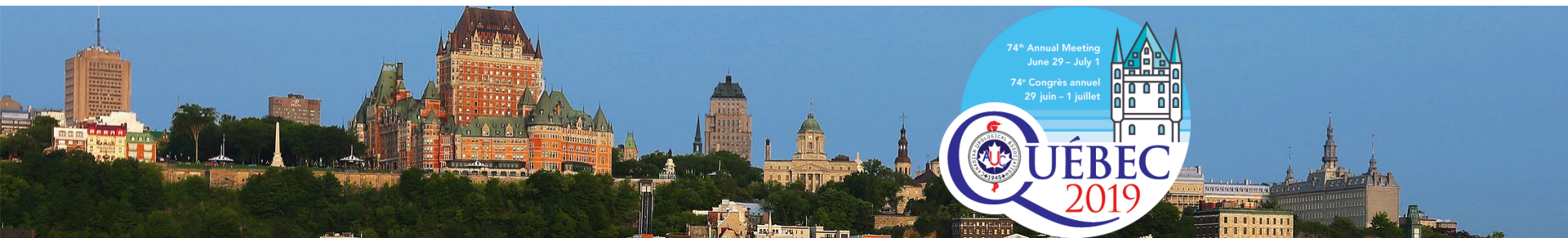
Take home message

- It is OK to abandon URS rather than cause harm
- Prefer to stent if possible
- Possible role for pre-stenting prior to URS



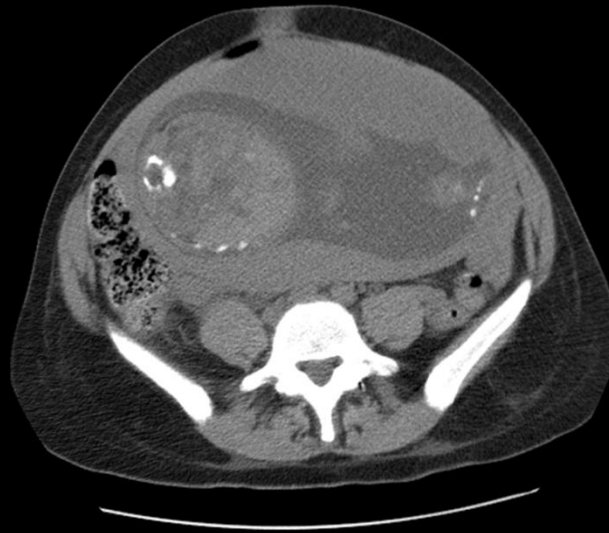
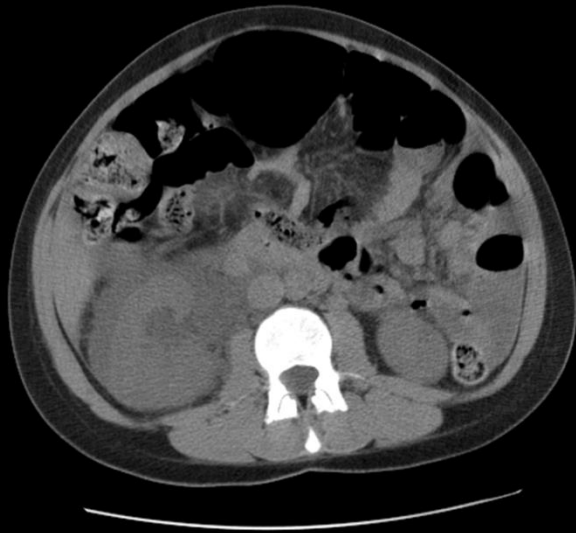
Case #4

- 24 yo female
- Presents with right flank pain, nausea and emesis to ER
- Labs:
 - Fever 38.5
 - BP 108/64
 - Pulse 117
 - Cr 1.43 mg/dL
 - WBC 20.0
 - Abnormal urine microscopy: +nitrites, +leuk



- PMH:

- Nephrolithiasis
- s/p Right PCNL 2017, and left URS
- SA: Calcium Phosphate

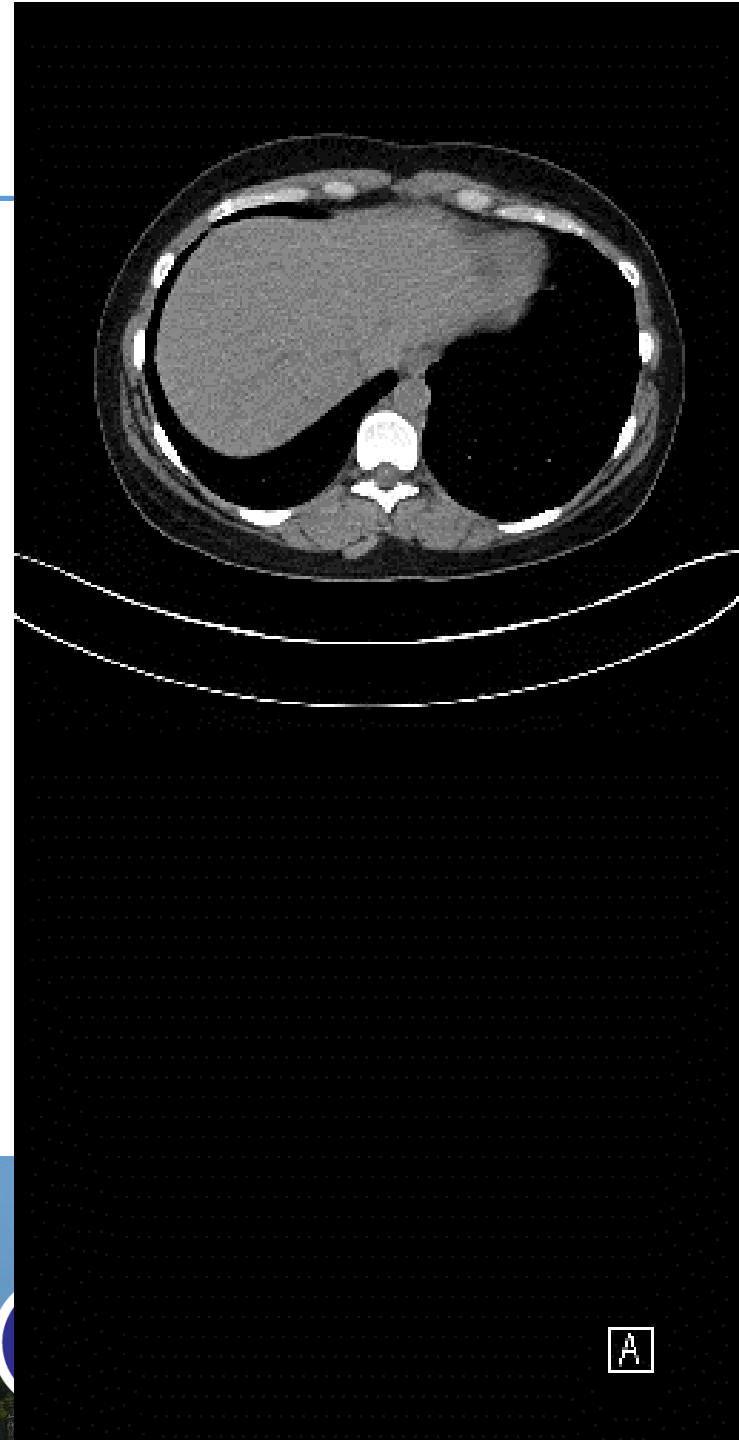


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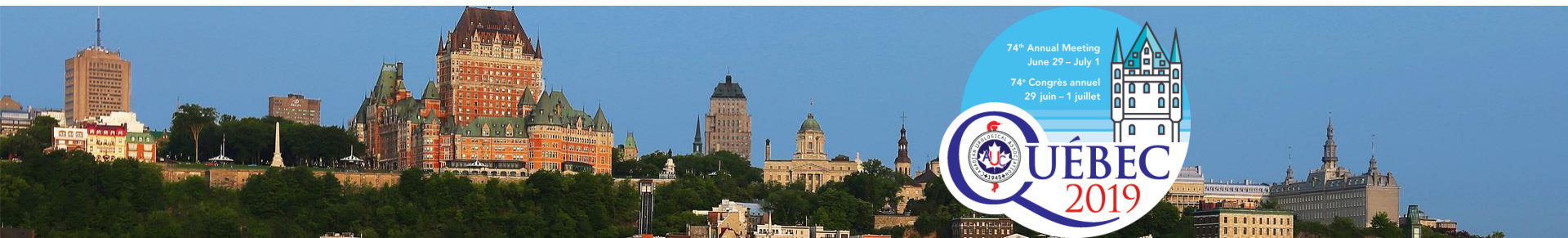
Next steps

- Empiric broad spectrum abx
 - Right neph tube place by IR
 - Cultures obtained from NT
-
- Low dose CT provides benefits with minimal exposure (6 mGy)



Definitive management

- Repeat US confirms persistent stone
- Right URS with LL and extraction
 - Under spinal anesthesia
 - Semi-rigid URS to fragment/extract stone
 - Flexible URS to clear ureter
 - US guidance
- No stent, NT maintained and capped after one week.
 - Tolerated for 24 hours removed in the office



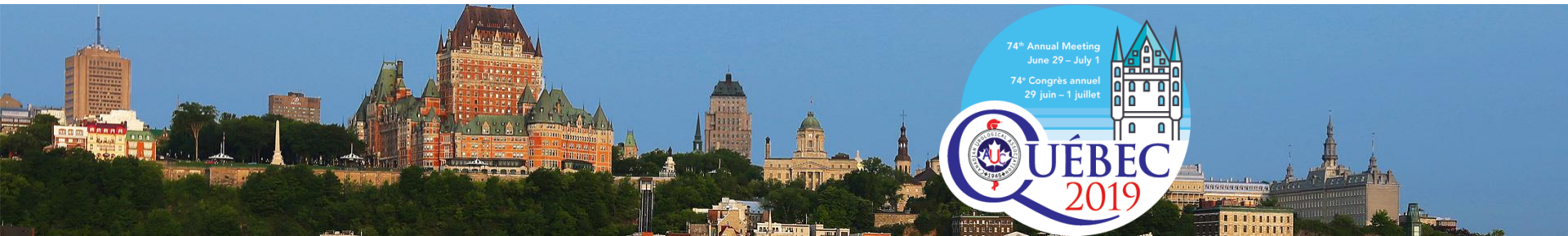
Stones in pregnancy

- The recurring question

Drain

or

Remove the stone



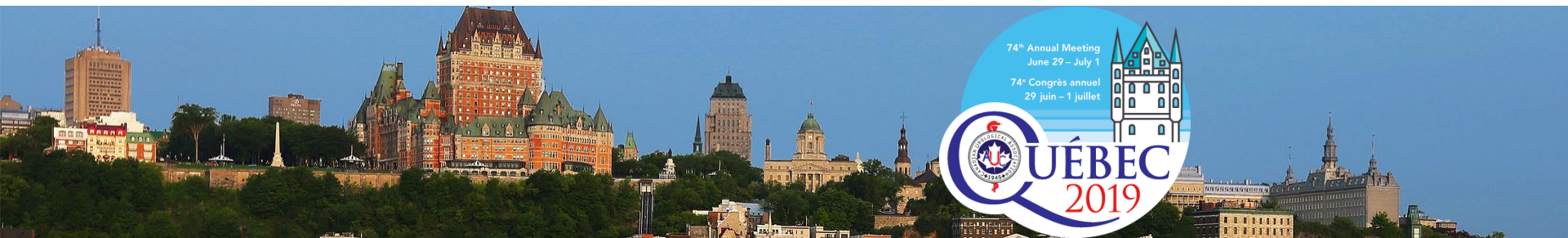
Drain or remove?

Drain

- Infected system
- Early in pregnancy (T1)

Ureteroscopy

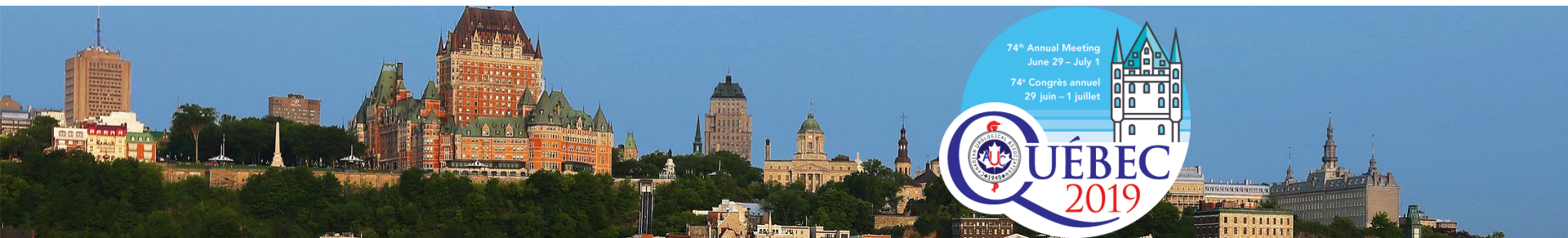
- Non-infected system
- Later in pregnancy (T3)
- Stone fails observation
- Ongoing symptoms
- Tube symptoms
- Drainage has failed
 - Encrusted tubes
 - Recurrent infections



Audience Poll

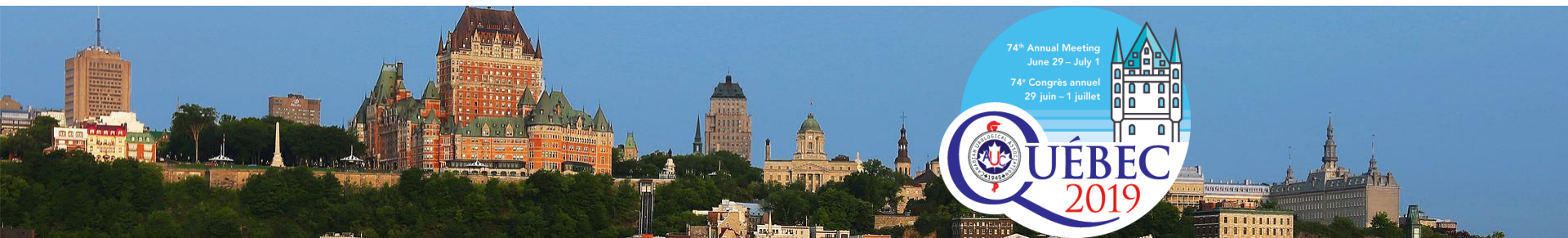
32yo primip, T3, 7mm right distal ureteral stone with ongoing colic, no evidence of infection

1. Insert ureteric stent
2. Place right nephrostomy tube
3. Right ureteroscopy and laser lithotripsy
4. Shock wave lithotripsy



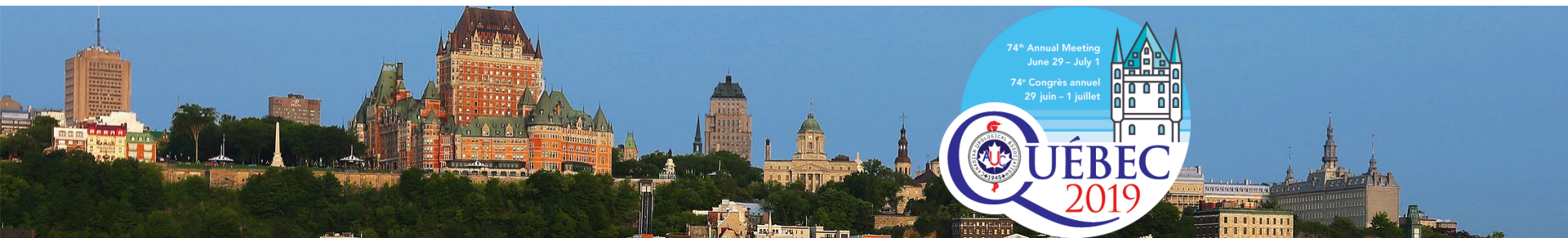
CUA guidelines

- Recommendation: First-line diagnostic testing for stones in pregnancy is ultrasound, but low-dose CT or MRI can also be used.
- In those patients presenting with signs of sepsis, antibiotics and urinary decompression via a nephrostomy tube or ureteral stent are of primary importance.



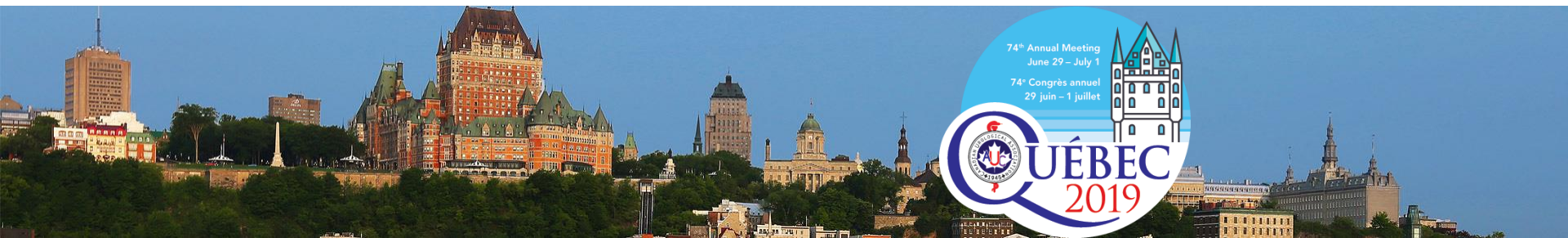
CUA guidelines

- Definitive therapy should be delayed until the infection is treated.
- URS and laser lithotripsy is safe in pregnancy; however SWL and PCNL are contraindicated in pregnancy (Level of Evidence Level 4, Grade C)



AUA/ES Guidelines

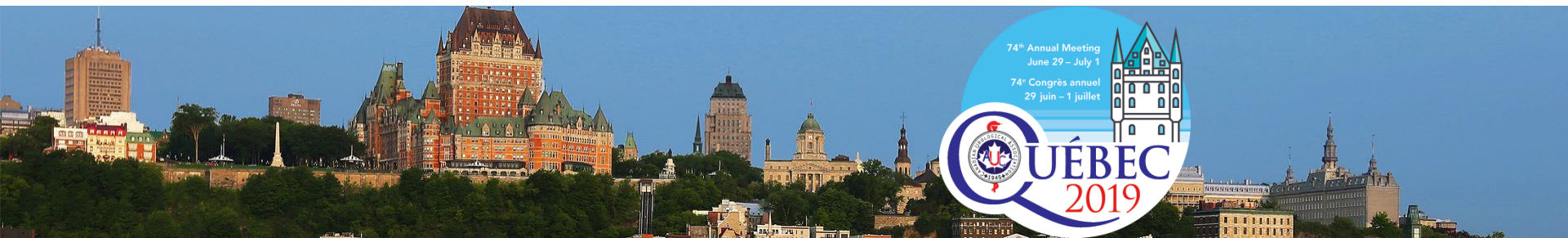
- Guideline Statement 56
 - In pregnant patients with ureteral stones, clinicians may offer URS to patients who fail observation.
 - Ureteral stent and nephrostomy tube are alternative options with frequent stent or tube changes usually being necessary.
 - *(Index Patient 15) Strong Recommendation; Evidence Level Grade C*



Case #5

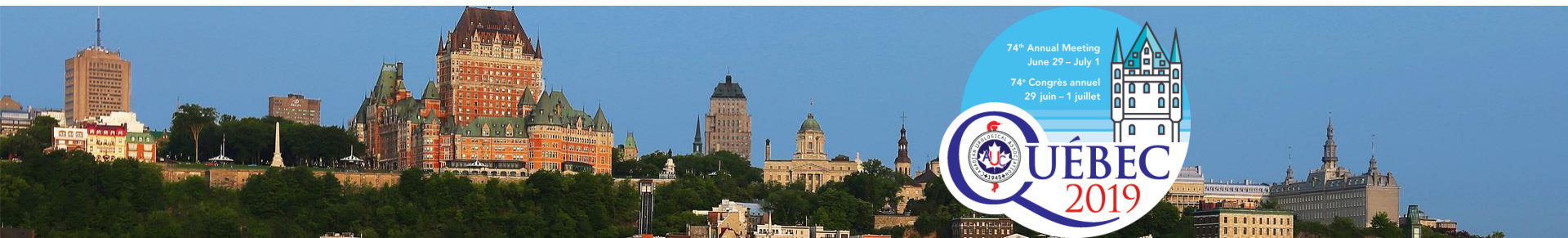
84 year old bedbound female from nursing home with history of:

- Dementia
- Atrial fibrillation – on apixaban
- Stroke – left sided hemiplegia
- Diabetes mellitus
- Gastroesophageal reflux disease
- Hypertension
- Seizure disorder
- *C. difficile* colitis
- Recurrent ESBL *E. Coli* UTI
- Moderately atrophic right kidney

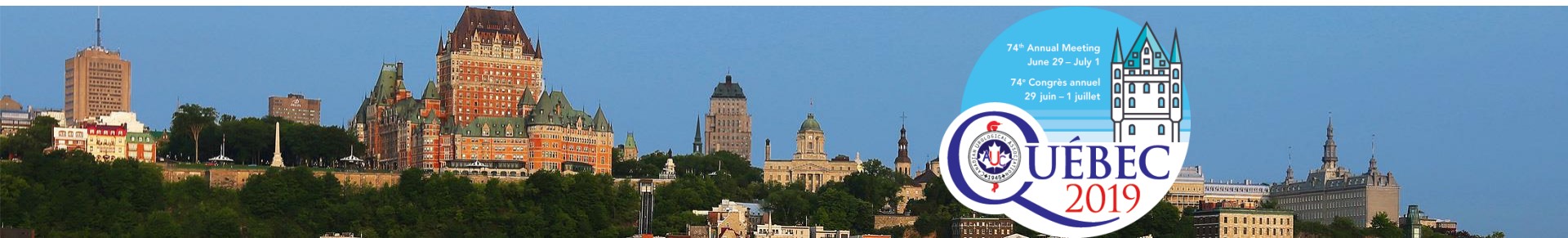


Management? No obstruction...

- Presents to hospital with recurrent fevers and hematuria
- Admitted to medicine and Urology consulted
 - Blood cultures negative
 - Urine cultures mixed growth
 - Renal function stable
- CT – partial staghorn calculus without hydronephrosis
- Next step?

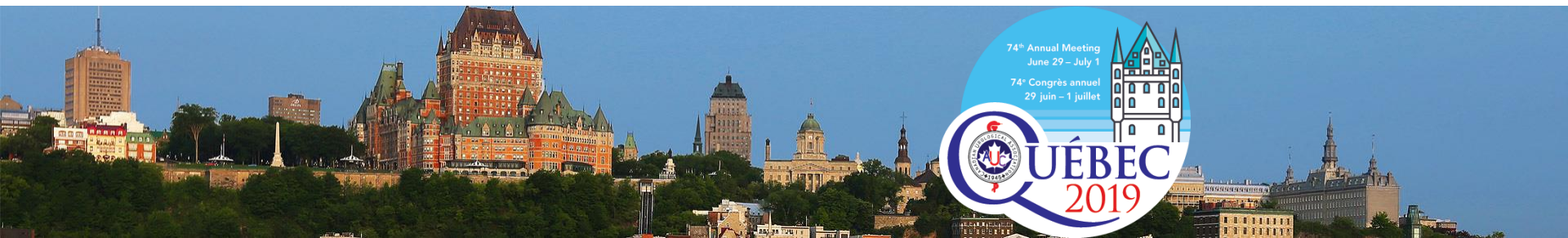


Management?

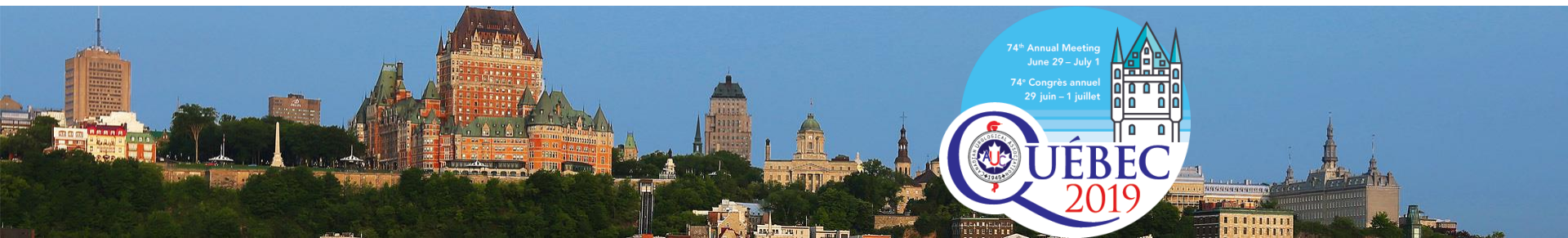
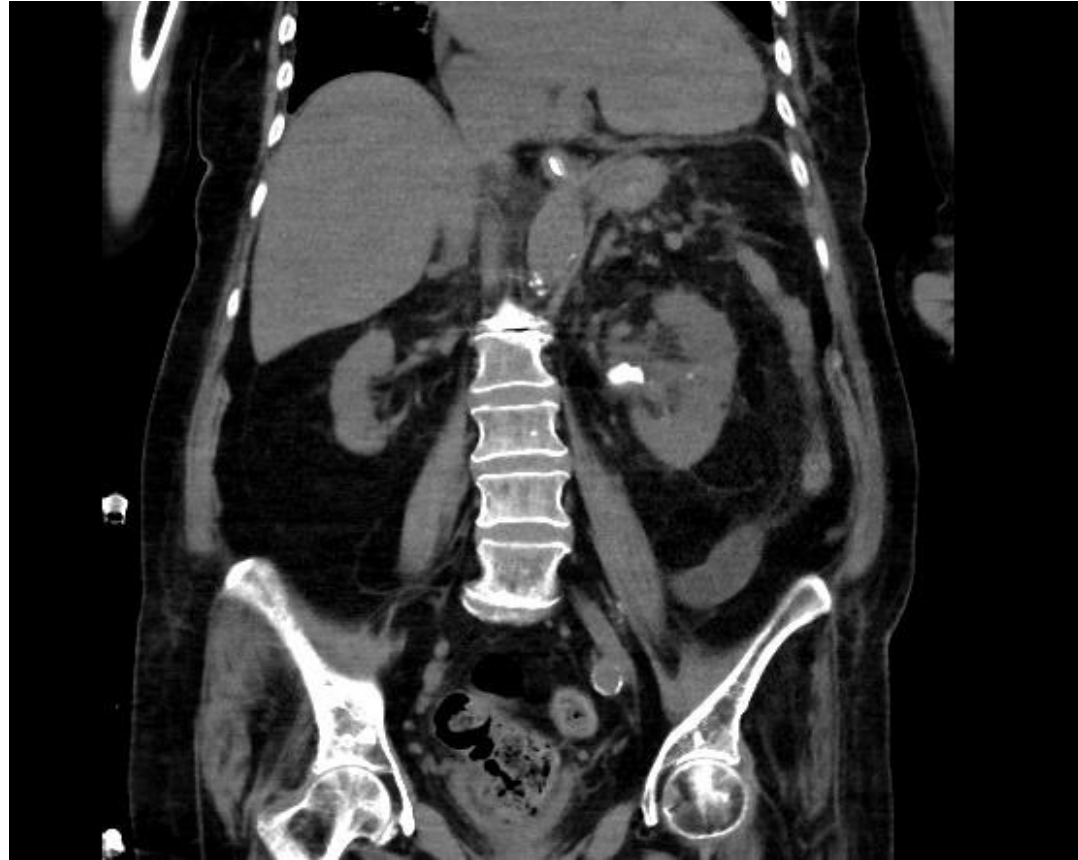


Management? Obstruction...

- 6 months later, presents to hospital with urosepsis: fever (T39) and hypotension
- Admitted to ICU
 - ESBL E. Coli bacteremia
 - Requiring inotropes / rebreather
- CT – mild progression of staghorn calculus
 - Now with hydronephrosis + perinephric stranding
- Next step?



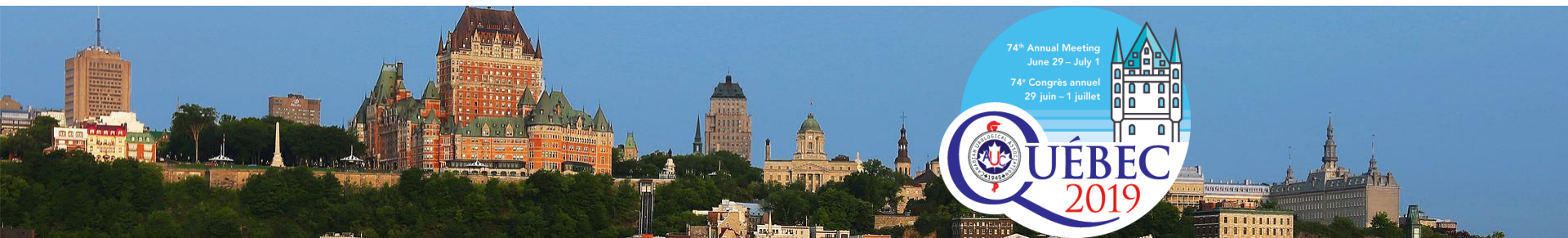
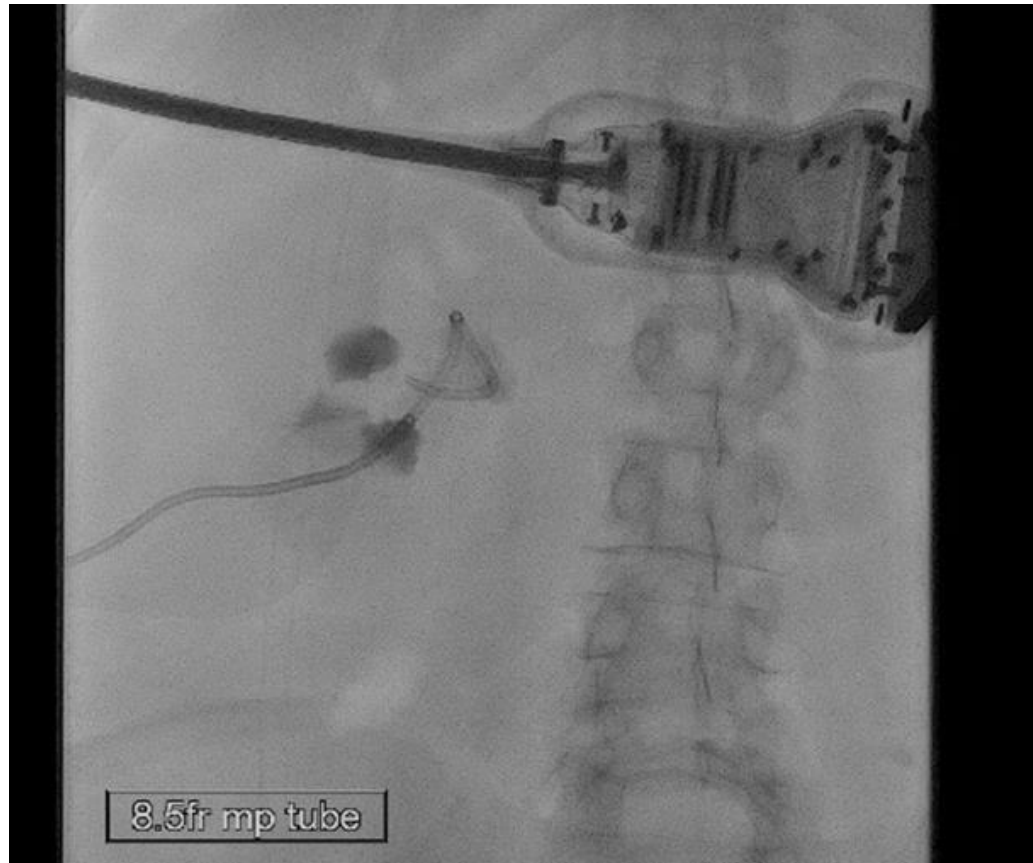
Management? Obstruction...



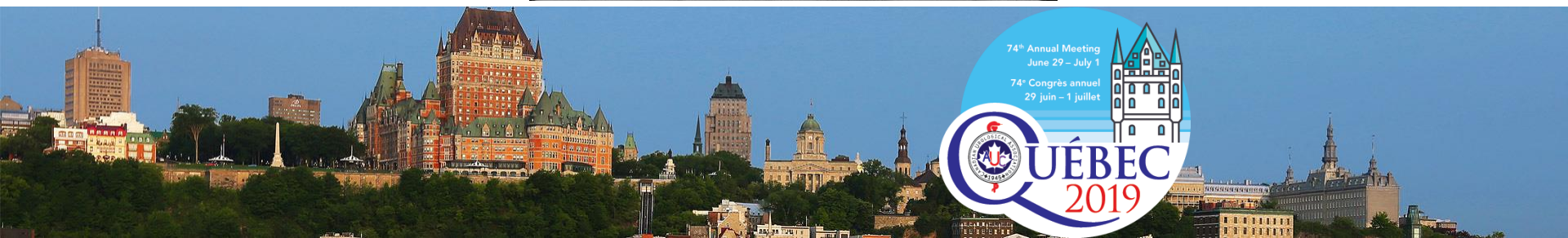
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Left nephrostomy tube inserted

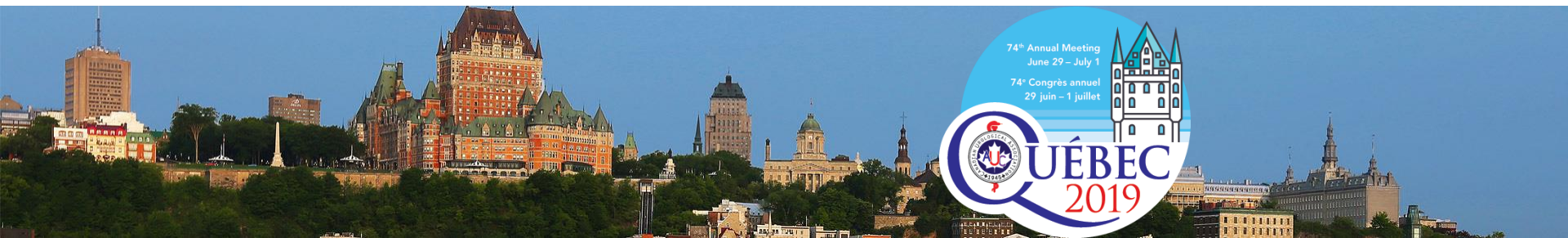


Converted to nephroureterostomy



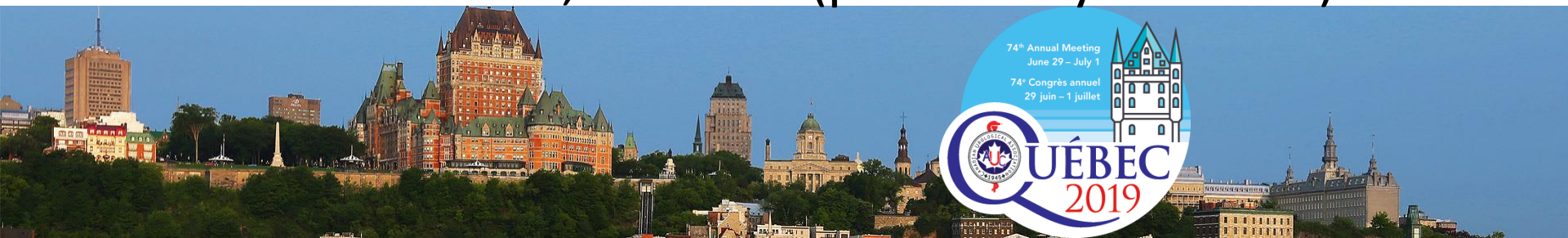
Epilogue

- Nephroureterostomy tube left uncapped
- NT changes q2-3 months arranged as outpatient
- Single admission for obstructed nephroureterotomy tube in last 9 months
 - Despite obstruction antegrade drainage was maintained with nephroureterostomy tube
- Patient is now oxygen dependant



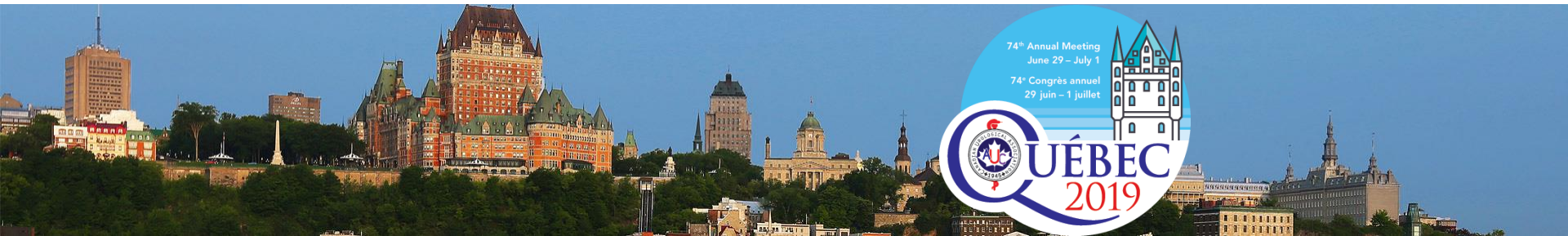
Perioperative Risk Assessment

- "not your father's Buick"
 - Typical PAC medicine consult likely low yield
- Consider formal optimization through an internist with interest in risk stratification
 - More time is always better
 - Duration of procedure
 - Safe to remain anticoagulated
 - Are there options (stent, NT, URS, PNL)
 - Risk of bleeding and fluid shifts
- Consideration of frailty (Canadian Frailty Scale) in addition to RCRI, ARISCAT (pulmonary function)



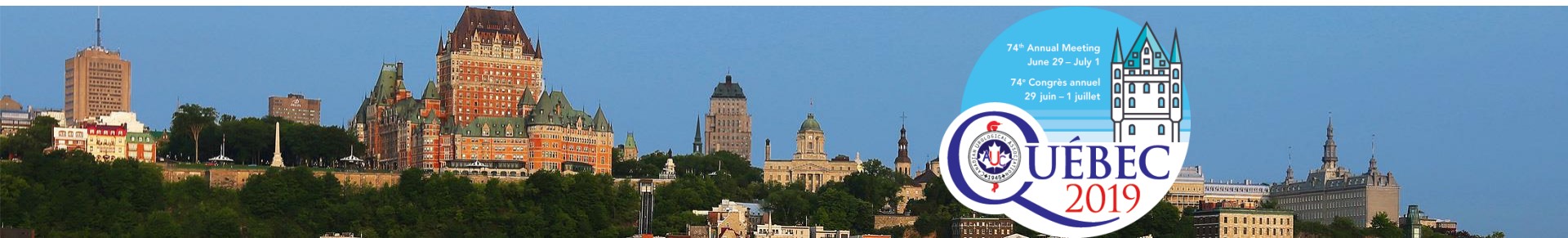
Consider Admission

- Easy to fall in the trap of doing endourologic procedures as day surgery
- Some elderly and or co-morbid well served by admission
 - Prevention and early detection of complications
 - CCS – preop BNP and post op troponins



Case #6

- 72 y.o. male with L renal colic
- NCCT:
 - Lower L ureteral stone and large prostate
- Another urologist attempts ureteroscopy: unable to access L ureteral orifice
 - Referred patient for SWL



Management?

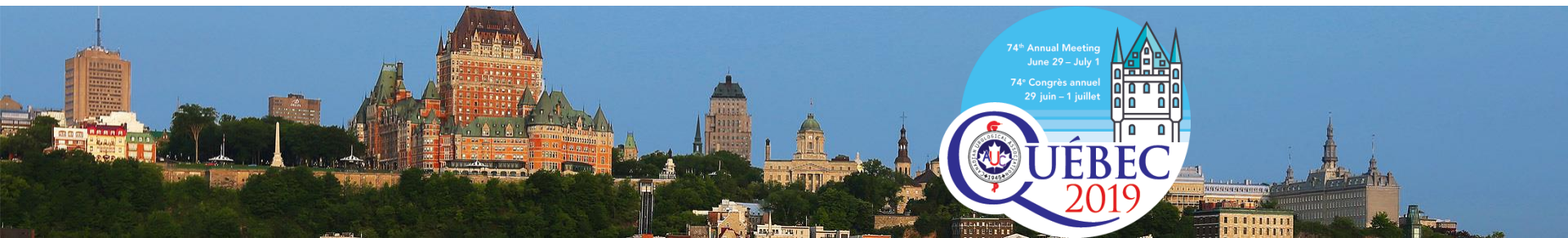
Pre SWL



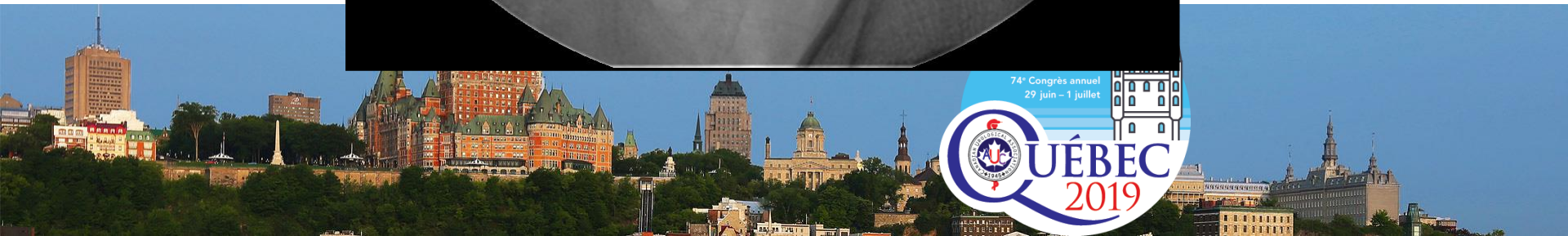
Post-SWL



Post-SWL # 2



URS

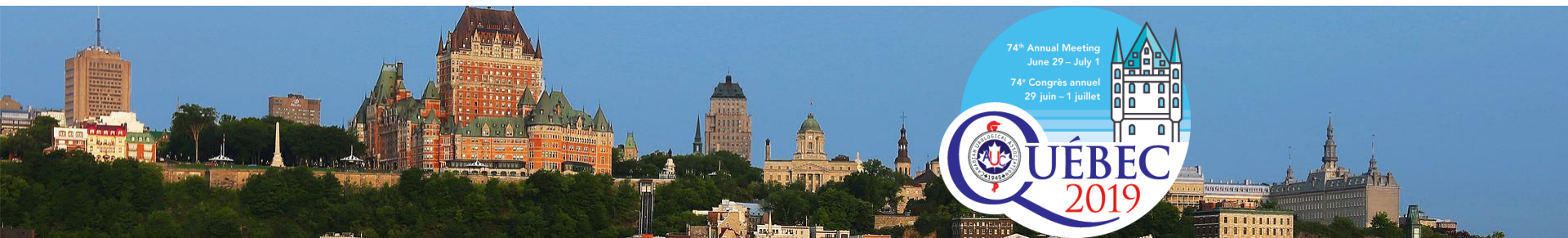


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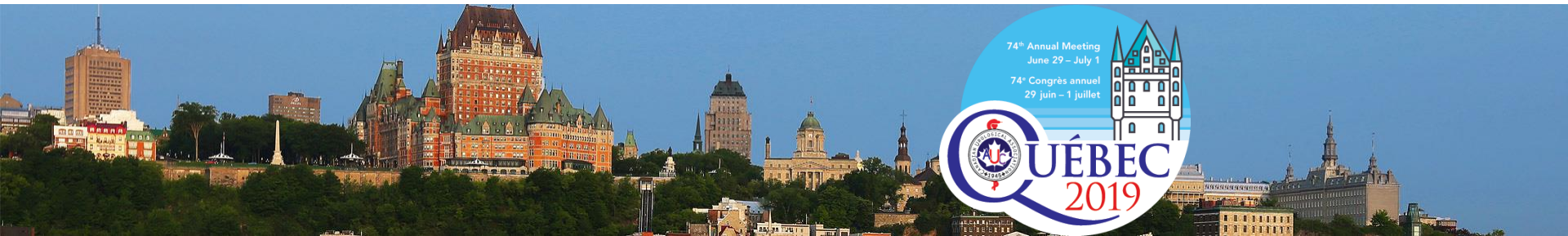
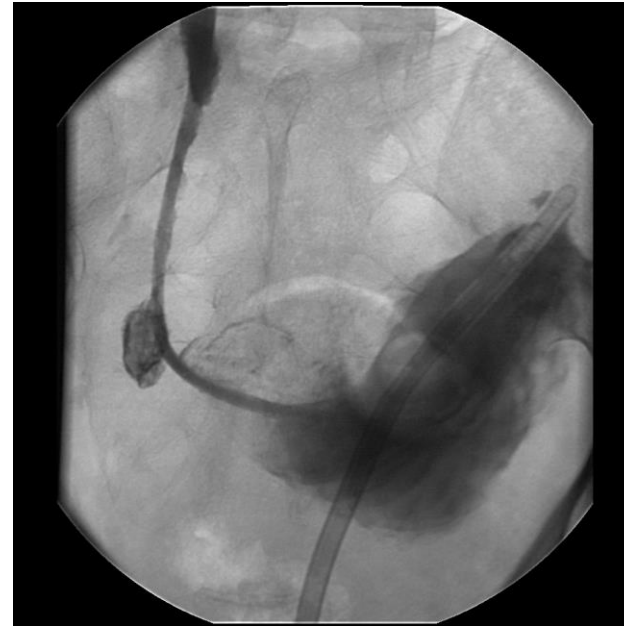
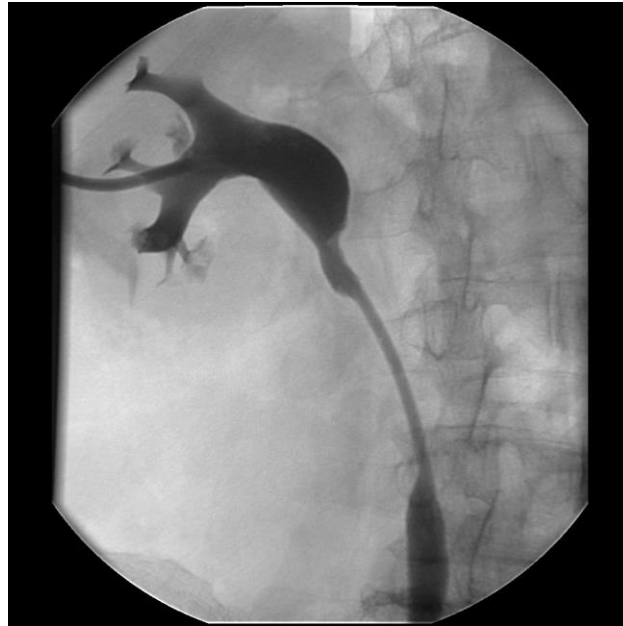


Options

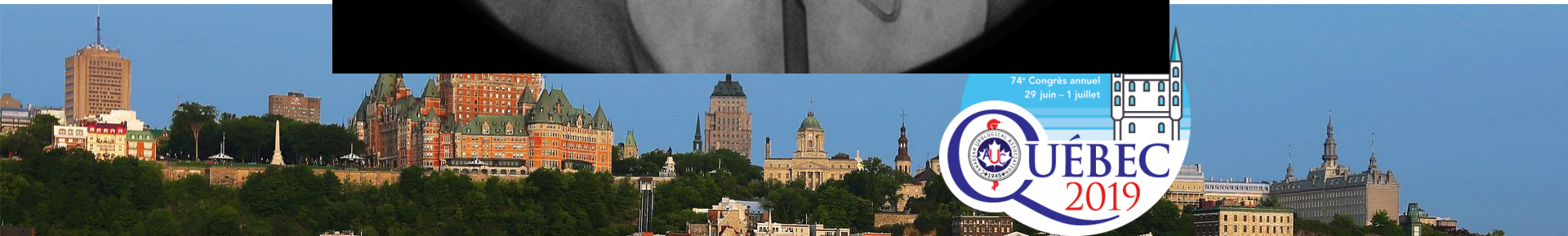
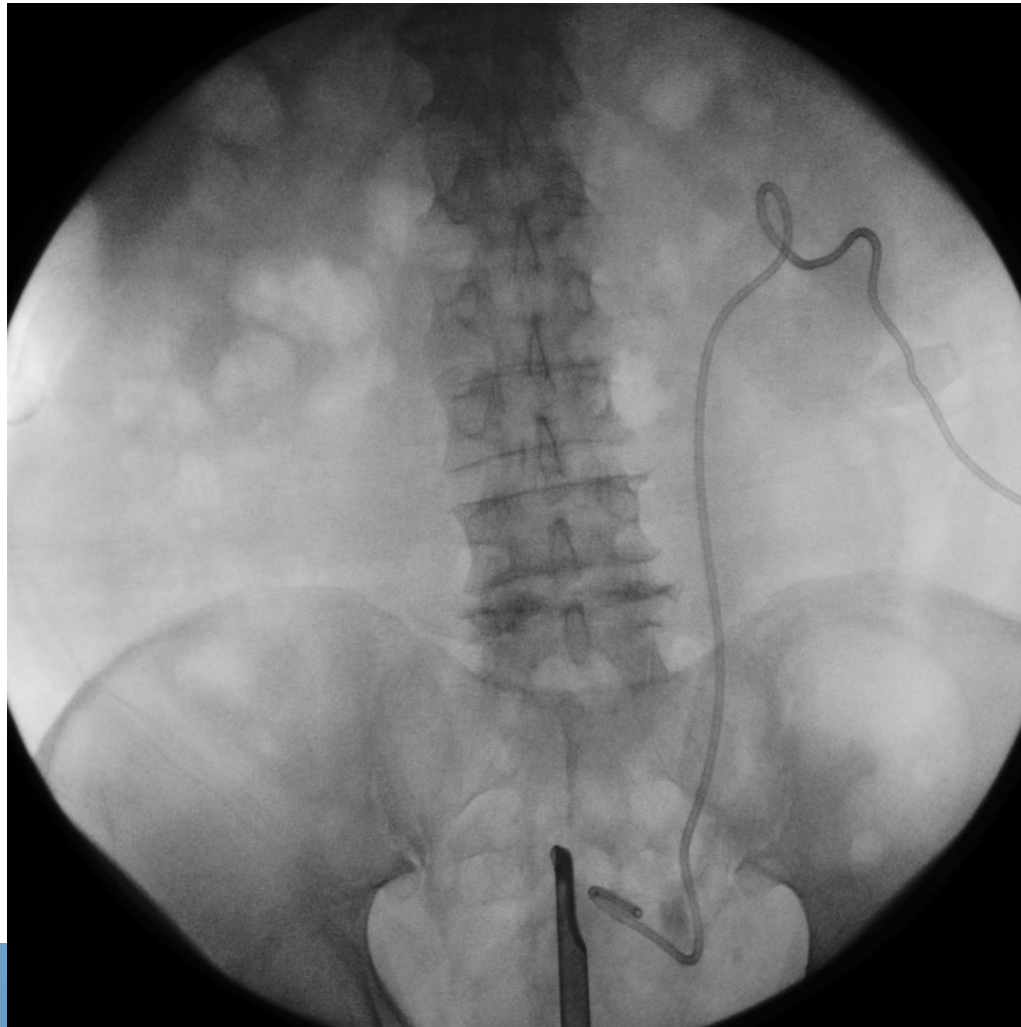
- Perc NU tube and retrograde URS
- Perc NT (or NU) tube and antegrade URS
- Open/lap/robotic ureterolithotomy



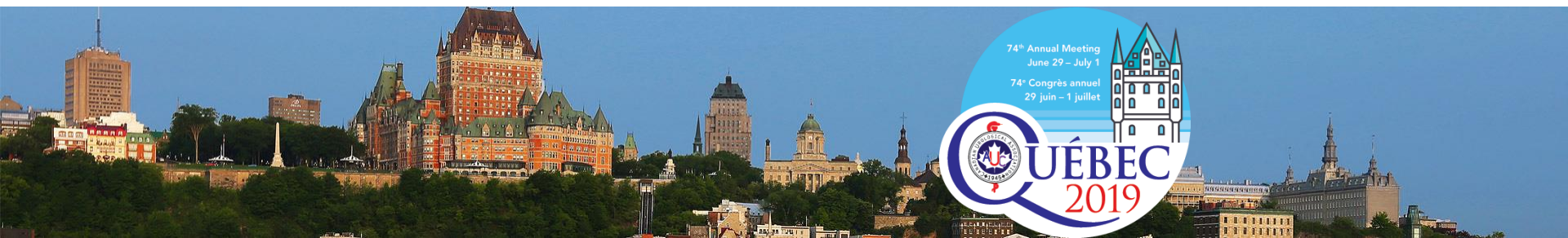
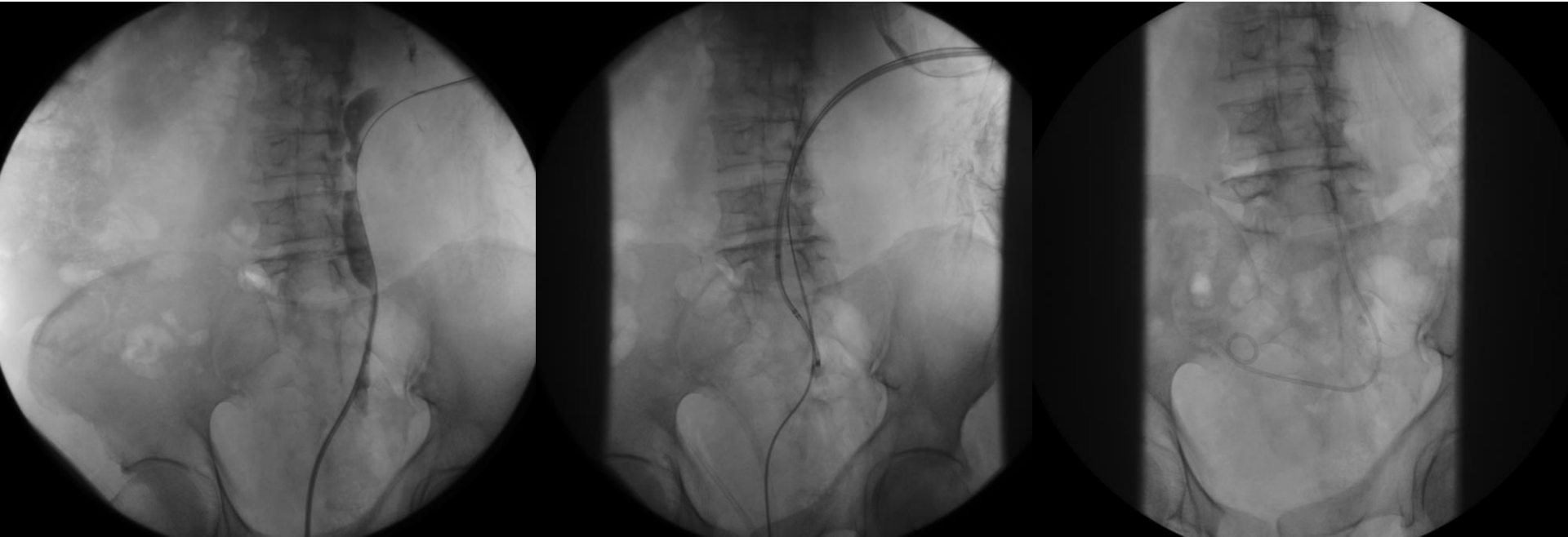
Retrograde approach #2



Now what?

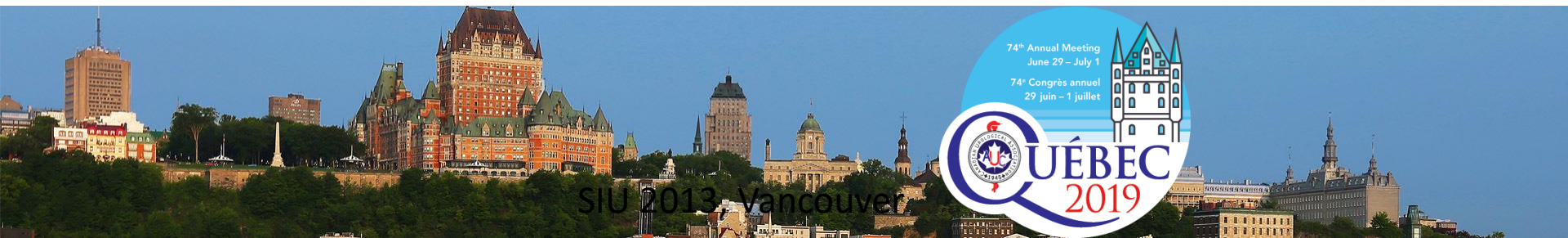
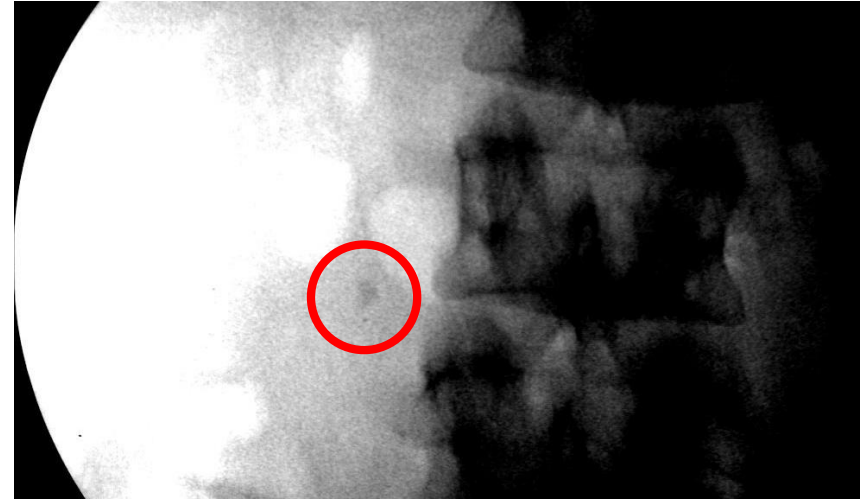


Antegrade approach



Case #7

- 34yo woman
- Presents with right renal colic
- No signs of infection or sepsis
- Normal renal function
- No comorbidities



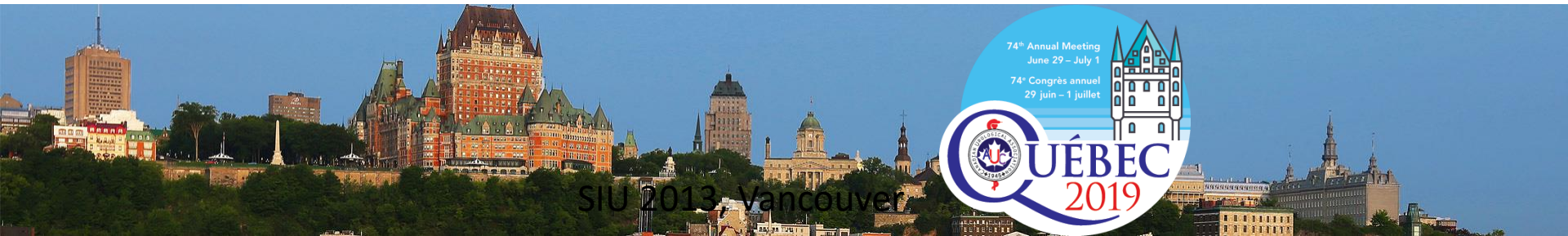
Management options?



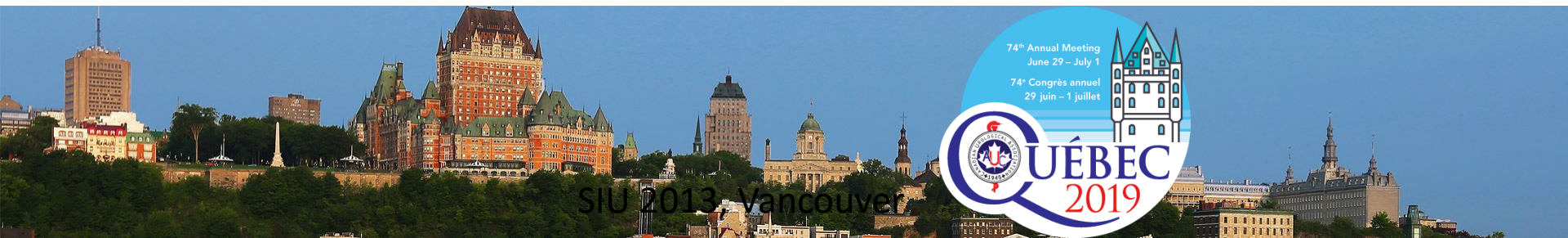
6x5 mm right upper ureteral stone with mild hydro



Right ureteroscopy



Right retrograde pyelogram



Right ureteroscopy: What now?

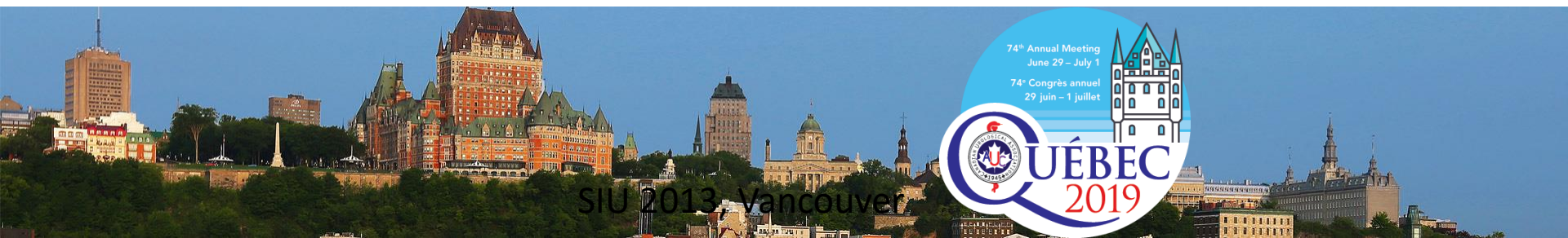
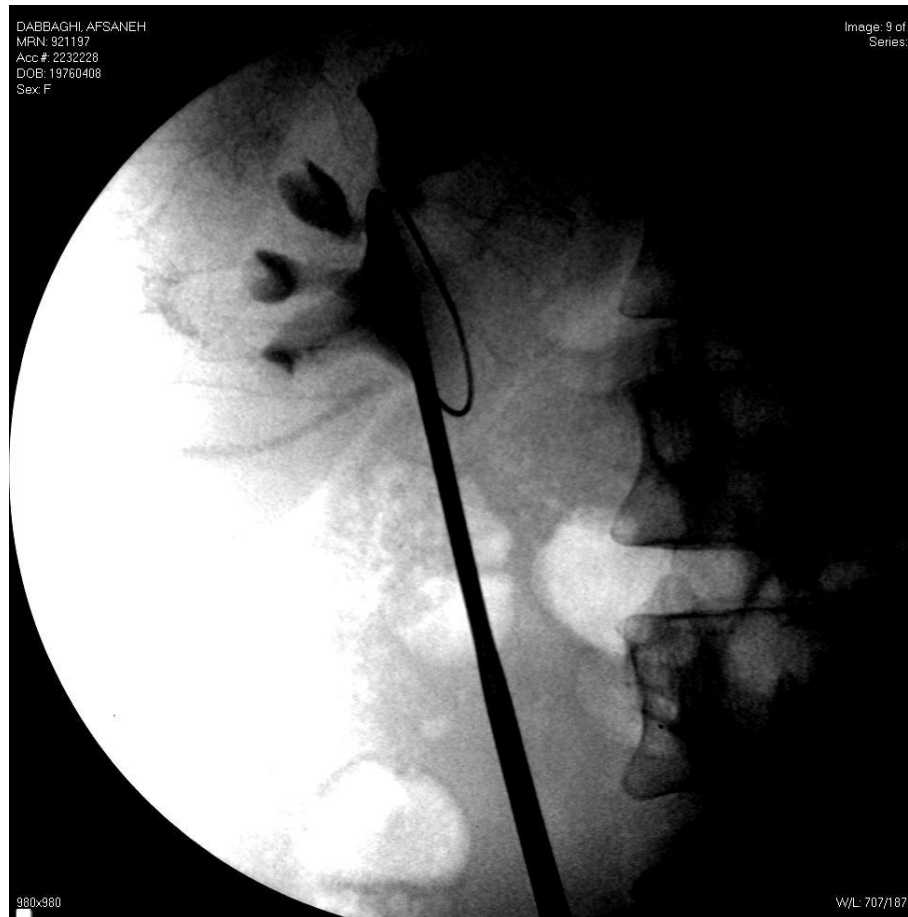


Strategies to avoid this?

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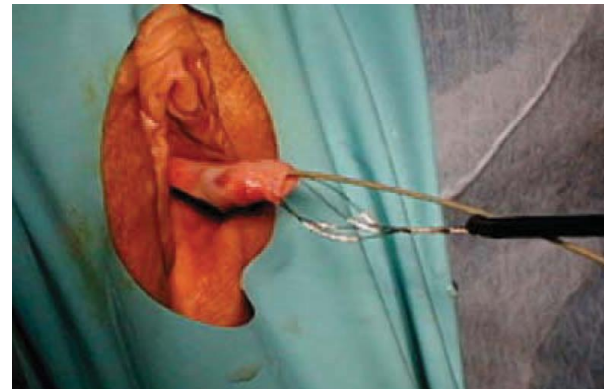
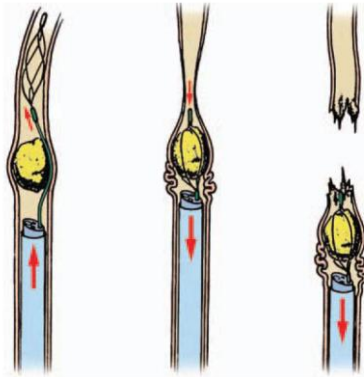


Soldiering on



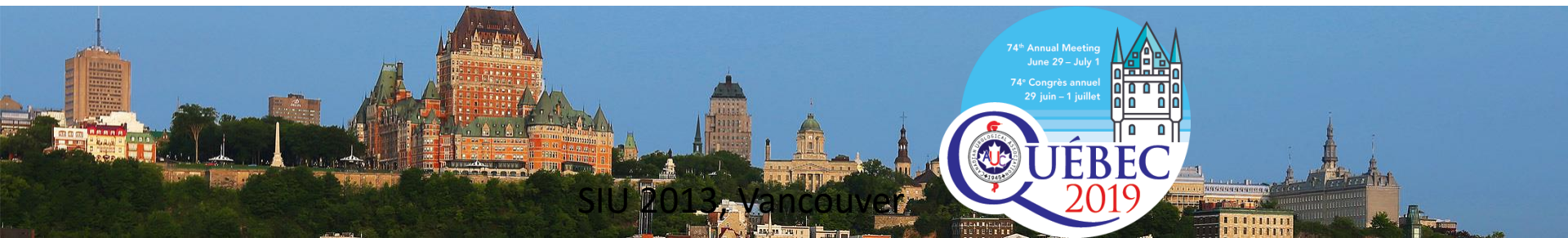
Completion of case

- Pulling out ureteroscope felt “pop”
- Long length of ureter extruded out urethral meatus with scope
- Used ureteral occlusion balloon to attempt to push ureter back to kidney: unsuccessful



(Reproduced with permission from Smiths Textbook of Endourology 2nd Ed.)

- **Now what?**



Right perc nephrostomy



Antegrade and retrograde study



74th Annual Meeting
June 29 – July 1
74^e Congrès annuel
29 juin – 1 juillet



SIU 2013 Vancouver

Antegrade and retrograde study



74th Annual Meeting
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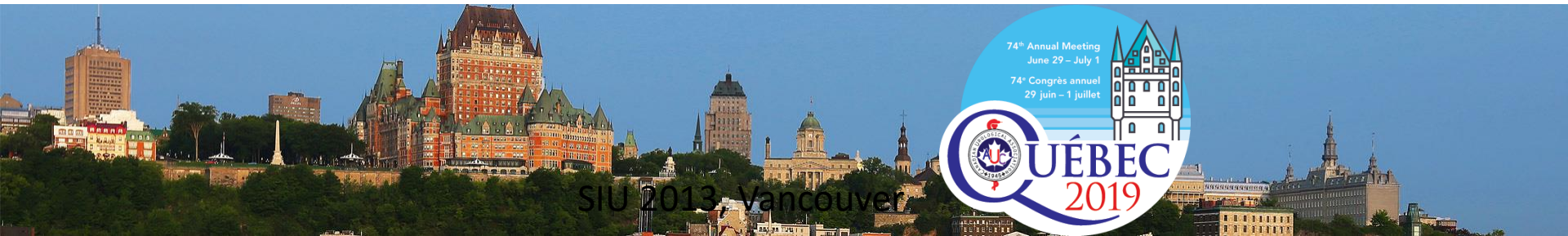


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Management?

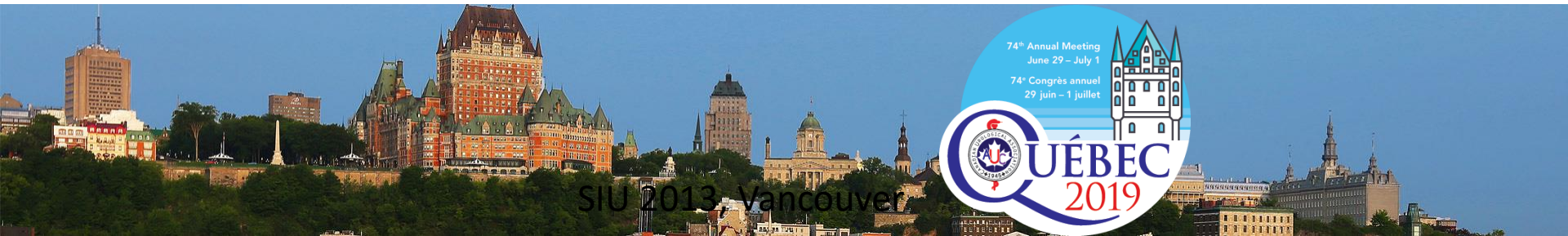
Other details:

- eGFR > 90 ml/min
- Tiny (1mm) left lower calyceal stones
- No comorbidities
- No other surgical procedures



Options:

- Chronic nephrostomy
- Pyelovesical silicone tube (extra-urinary diversion)
- Nephrectomy
- Psoas hitch and *very* long Boari flap with renal descensus
- Ileal ureter interposition
- Autotransplant



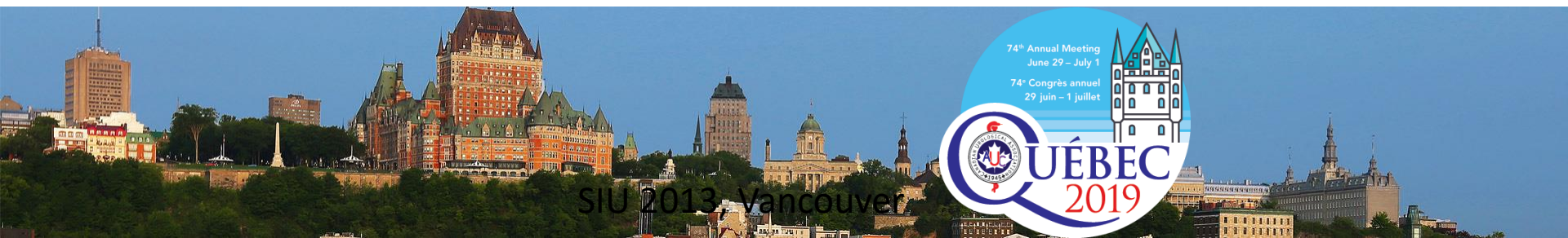
Avulsion

- Rare injury. More common in era of blind basketing and early ureteroscopy.
- Cause of injury, forceful extraction of large stone fragment or forceful insertion of ureteroscope without access sheath. Usually upper ureteral injury.
- Stop procedure and obtain percutaneous drainage. Primary repair is rarely possible.
- Renal autotransplantation, ileal ureteral replacement or nephrectomy will be required as a secondary procedure.



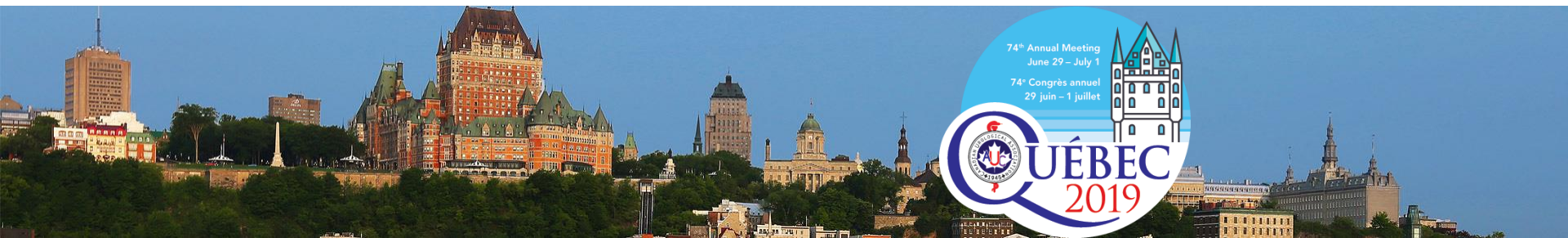
Avoidance

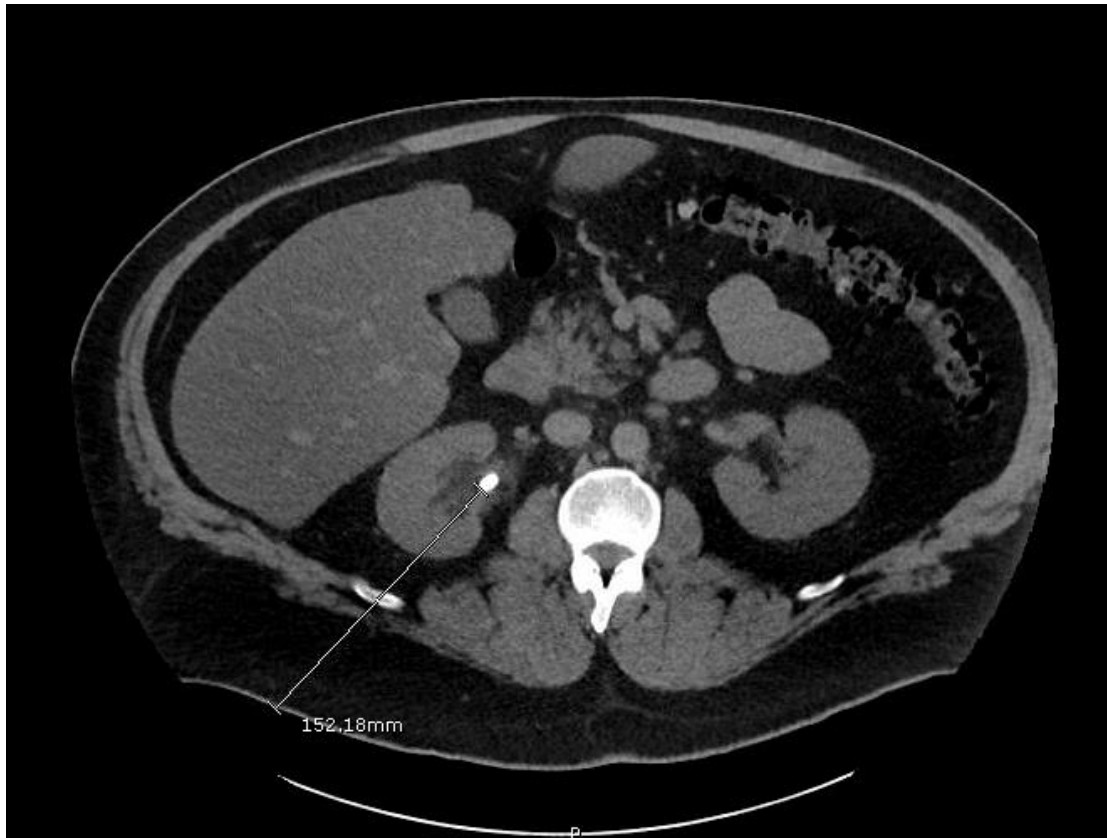
- If ureter “tight” on scope: stent and return another day
- Use small caliber semi-rigid scopes (<10Fr)
- Always use safety guidewire for ureteric stones
- Do not attempt to extract stones that are not “sliding”



Case #8

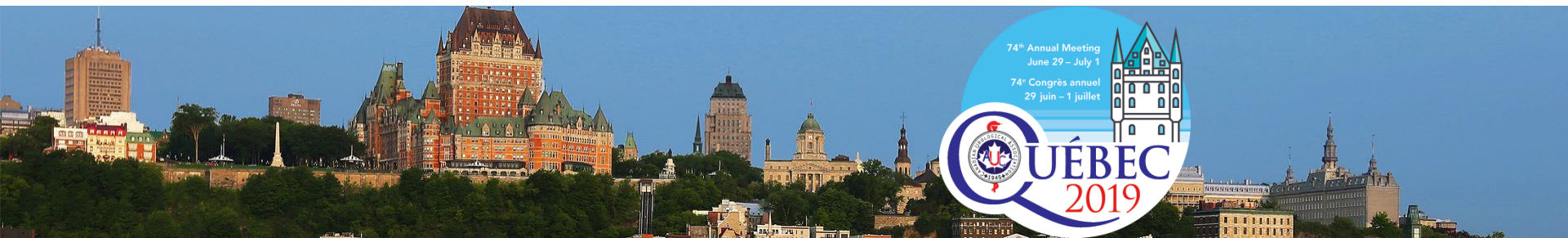
- HPI: 42 year old male presents with intermittent right flank pain over the past 2 months. No history of UTIs.
- PMH:
 - Morbid obesity (BMI 45.3)
 - Kidney stones
 - DM
 - HTN
- PSH:
 - Right URS/stent (tolerated stent poorly)





Non-contrast CT

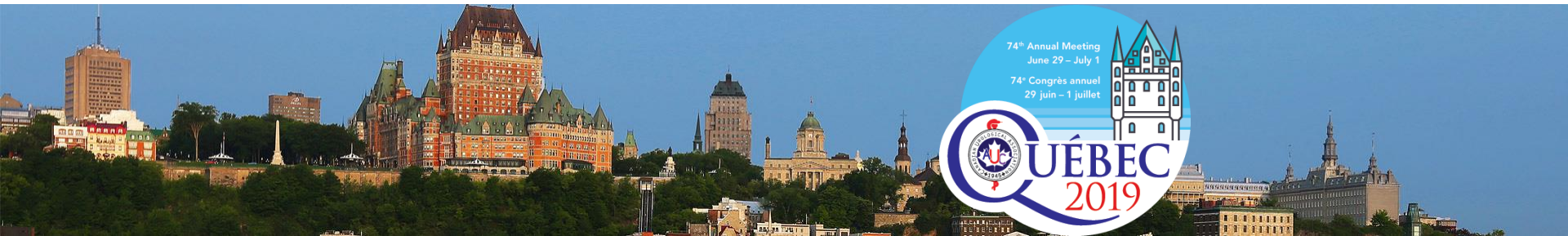
- 1.2 cm renal pelvis stone
- HU: 350
- SSD: >15 cm
- No hydronephrosis



Labs

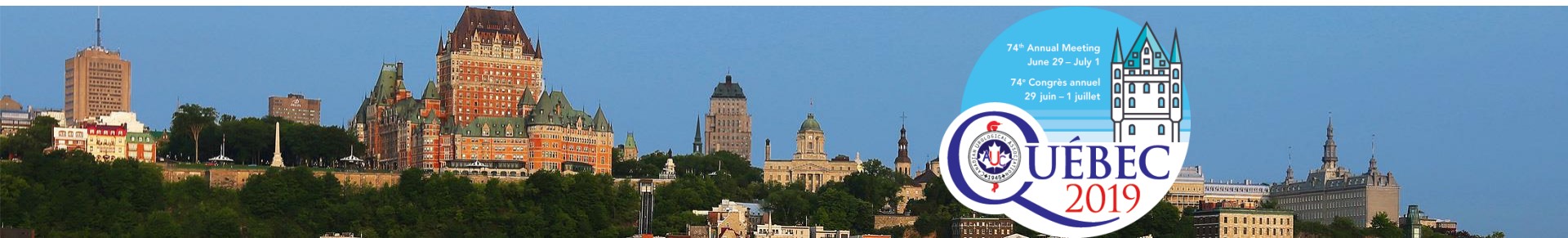
- UA: urine pH = 5.0
- Urine C&S: negative
- K = 3.8
- Creatinine = 100
- eGFR = 89

- **Management plan?**



Dissolution therapy

- Rx: K citrate
 - Follow up in 4 weeks
 - Repeat CT shows no change
 - Urine pH = 5.0
-
- Patient elects to undergo URS, but wishes to avoid a stent if at all possible.



Thank you!

St. Michael's Hospital

