FLEXIBLE URS

• Since 2001, recent development of new flexible URS and the miniaturisation of instruments allow today the direct diagnosis and treatment of upper urinary tract diseases

  - Smallest caliber actively deflectable (7.5F)
  - Working channel is 3.6F
  - 2-way active deflect°. : 270-270 degrees
  - Improved fiberoptics and digital technology

F-URS : NEW GENERATION

- Olympus
- Storz
- Wolf
- ACMI
- Olympus
- ACMI

- URFP5
- Flex-X2
- Viper
- DUR-8E
- URF-V
- DUR-D
Access to the entire collecting system: 95-100%

Busby & Low, 2004
Beiko & Denstedt, 2007
Improvements in Ureteroscope Design

FiberOptic

Digital System
ELECTROMAGNETIC SPECTRUM
NANOMETER

- Rayon X: 190 - 390 nm
- UV: 390 - 488 nm
- Visible: 488 - 514 nm, 532 nm, 577 - 630 nm
- KTP
- Alexandrite
- Ho:YAG
- Ruby
- Er:YAG
- Nd:YAG
- CO₂
- Diode
- Nd:YAG
- INFRA-RED: 755 nm, 1060 nm, 2100 nm, 10600 nm

Excimère
Argon
HOLMIUM YAG LASER

CALCULASE 10W: Karl Storz

- Introduction of Holmium:YAG laser which can fragment any type of stone, ablate and cut tissue has expanded the role of FURS

SPECIAL CIRCUMSTANCES

DJ INCURSTATION
MATERIALS

- WIRES
- DLC & URETERAL ACCESS SHEATH
- NITINOL BASKET
- PORT SEAL / MANUAL HAND DEVICE
- LASER FIBERS
NEW NITINOL BASKET

N-Compas® COOK Medical

Coloplast Catch
NITINOL RETRIEVING DEVICES
NEW NITINOL BASKET

N-Trap®

To prevent stone migration during Rigid URS
URETERAL ACCESS SHEATH

- Facilitate multiple entries/exits
- Avoid effects of ureteral edema
- Maintain low intrarenal press.
- Limit operating time
- Facilitate irrigation
- Protect Flexible URS

Kourambas, J Urol 2001
ADEQUATE FLOW OF IRRIGANT

SPECIFIC PORT SEAL & IRRIGATION DEVICES
To Preserve & Increase irrigation
SET-UP
SET-UP
PATIENT POSITION
INSPECT EACH CALYX WITH C-ARM CONTROL
INDICATIONS

• DIAGNOSTIC (10%)
  - Obstructions
  - Defect on IVP
  - Unexplained Hematuria
  - Positive Cytology
  - Recurrent uroth. tumor

• THERAPEUTIC (90%)
  - STONES (75%)
    - Kidney-Ureter
    - Lower Calyx
    - Cystine
    - Anatomic abnormal.
    - Obesity
    - Coagulopathy
    - Associate° FURS-Perc
  - Strictures (5%)
    - Ureter - UPJO
  - Urothelial Tumors (10%)
  - Foreign body: stent, ...

Beiko, Urol Clin N Am 2007
Table 19: Treatment alternatives for patients with ureteral stones

<table>
<thead>
<tr>
<th>Stone size</th>
<th>Preference</th>
<th>Procedure</th>
<th>LE</th>
<th>GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 9 mm</td>
<td>1</td>
<td>α-blocking agents</td>
<td>1a</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ESWL</td>
<td>1a-4</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>URS</td>
<td>1a-4</td>
<td>A</td>
</tr>
<tr>
<td>≥ 10 mm</td>
<td>1</td>
<td>ESWL</td>
<td>1a-4</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>URS</td>
<td>1a-4</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Antegrade PNL</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>LAP</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OS</td>
<td>4</td>
<td>C</td>
</tr>
</tbody>
</table>

ESWL = extracorporeal shock wave lithotripsy, also including piezolithotripsy; PNL = percutaneous nephrolithotomy; LAP = laparoscopic surgery; OS = open surgery; LE = level of evidence; GR = grade of recommendation.
Table 17: Active removal of radiopaque (calcium) renal stones with a largest diameter ≤ 20 mm (surface area ≤ 300 mm²)

<table>
<thead>
<tr>
<th>Preference (decreasing order)</th>
<th>Procedure</th>
<th>LE</th>
<th>GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ESWL, also including piezolithotripsy</td>
<td>1b</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>PNL</td>
<td>1b</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>RIRS</td>
<td>2a</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>Laparoscopic surgery</td>
<td>2a</td>
<td>C</td>
</tr>
<tr>
<td>5</td>
<td>Open surgery</td>
<td>4</td>
<td>C</td>
</tr>
</tbody>
</table>

LE = level of evidence; GR = grade of recommendation

Table 19: Active removal of cystine stones with a largest diameter ≤ 20 mm (surface area ≤ 300 mm²)

<table>
<thead>
<tr>
<th>Preference</th>
<th>Procedure</th>
<th>LE</th>
<th>GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ESWL (including piezolithotripsy)</td>
<td>2a</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>PNL</td>
<td>2a</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>RIRS</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>Laparoscopic surgery</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Open surgery</td>
<td>4</td>
<td>C</td>
</tr>
</tbody>
</table>

LE = level of evidence; GR = grade of recommendation; ESWL = extracorporeal shock-wave lithotripsy
Table 20: Active removal of radiopaque (calcium) renal stones with a largest diameter > 20 mm (surface area > 300 mm²)

<table>
<thead>
<tr>
<th>Preference</th>
<th>Procedure</th>
<th>LE</th>
<th>GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PNL</td>
<td>1b</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>ESWL (including piezolithotripsy)</td>
<td>1b</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>PNL + ESWL (including piezolithotripsy)</td>
<td>2b</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Laparoscopic surgery</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>Open surgery</td>
<td>4</td>
<td>C</td>
</tr>
</tbody>
</table>

LE = level of evidence; GR = grade of recommendation; ESWL = extracorporeal shock-wave lithotripsy
F-URS success rate was defined as stone free (SF) or remaining fragments (RF) less than 3 mm.

Post operative evaluation:
- Second look: 1-3 weeks
- KUB at Day 1 and RUS at Day 30
- KUB Day 1 and NCCT at Day 30
RESULTS (>2 CM)

First session

SF Rate : 55.6%

TRAXER et al, WCE 2009
RESULTS (>2 CM)

Second session

SF Rate: 83.8%

Outcome after 2nd F-URS

SUCCESS

FAILURE
RESULTS (>2 CM)

Third session

SF Rate : 93.2%

TRAXER et al, WCE 2009
RESULTS ( >2 CM)

- 1st F-URS: 63%
- 2nd F-URS: 89.80%
- 3rd F-URS: 97.90%
- 4th F-URS: 78.90%

- 2 - 3 cm:
  - 1st F-URS: 0.00%
  - 2nd F-URS: 10.50%
  - 3rd F-URS: 0.00%
  - 4th F-URS: 73.60%

- > 3 cm:
  - 1st F-URS: 2.4%
  - 2nd F-URS: 52.60%
  - 3rd F-URS: 0.00%
  - 4th F-URS: 78.90%
LARGE RENAL PELVIC STONE
COMPLETE LASER FRAGMENTATION IN ONE SESSION
Large Renal stone (multiple) fragmentation with one session
TREATMENT OF SOLITARY KIDNEY STONE
TOTAL VOLUME : 25 mm (1 session)
BILATERAL COMPLEX RENAL STONE
2 + 1 PROCEDURE
LOWER POLE STONE REPOSITIONING
Tipless Nitinol Basket

LP Stone < 15 mm

Schuster, 2002, Kourambas 2000
EAU Guidelines 2009
LOWER POLE STONE REPOSITIONING

- Kourambas et al (Urol 56, 2000):
  - Stone displaced w/ nitinol basket or grasper
  - 90% SF for displaced
  - 83% for *in situ* stones

- Schuster et al (J Urol 168, 2002):

<table>
<thead>
<tr>
<th></th>
<th>In Situ N=59</th>
<th>Displaced N=19</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>71%</td>
<td>94%</td>
<td>0.058</td>
</tr>
<tr>
<td>≤1 cm</td>
<td>77%</td>
<td>77%</td>
<td>ns</td>
</tr>
<tr>
<td>&gt;1 cm</td>
<td>29%</td>
<td>100%</td>
<td>0.005</td>
</tr>
</tbody>
</table>
LP STONE REPOSITIONING

Fiber laser in deflected URS: important loss of energy throughout the way.

\( n \) Watts

\( n-x \) Watts
LOWER POLE STONE STUDY II

Group 1 ($\leq 1$ cm)  
(n=67)

- SWL  
  (n=32)
- URS  
  (n=35)

Stone Free: 1° outcome parameter 35 vs 52% (ns)

Pearle MS et al. J Urol, 2005
Stone-Bearing caliceal diverticulum
Stone-Bearing caliceal diverticulum
We successfully treated caliceal diverticulum stone in lower pole while others calim difficulties of obtaining success rate.

Batter S, Dretler S: J Urol 1997; 158
Stone-Bearing caliceal diverticulum
SPECIAL CIRCUMSTANCES

HORSESHOE AND PELVIC KIDNEY

• Preminger G. J Endourol 2005
  8 patients : SFR 85% (1 session)
SPECIAL CIRCUMSTANCES

MORBIDLY OBESITY

PEDIATRIC

Nguyen TA, J Endourol 1998

EAU Guidelines 2009
SPECIAL CIRCUMSTANCES

INTERNAL / EXTERNAL URINARY DIVERSION
SPECIAL CIRCUMSTANCES

JJ INCRUSTATION-MIGRATION
RESIDUAL FRAGMENTS

< 4 mm..... < 2mm..... ?!

Streem J Urol 1995 ; MS Pearle, J. EndoUrol 2009
RESIDUELS FRAGMENTS: COAGULUM
Percent plaque coverage directly correlates with the number of stones formed even when corrected for the duration of stone disease.

Kim Journal of Urology 2005
RANDALL’S PLAQUE

Submucosal calcifications erode to papillary surface whereby exposure to urine results in salt deposition and papillary stone formation.
RANDALL’S PLAQUE

Matlaga et al, J. of Urology
May 2006
ADVANTAGES-DIS OF FLEXIBLE URS

• Stone removed entirely / outpatient procedure
• Ho-Laser: universally effective / all stones types
• Radiolucent stones definitively treated with URS
• Low complication rate (infection, pain, stricture)

Bagley, 2008

• Special circumstances:
  • Patient Obesity
  • Scoliosis & body deformities
  • Bleeding diatheses
  • Renal abnormalities (HK)
  • Patient preferences
• DIS:
  - COST, Time-Consuming, Durability,
CONCLUSIONS

- RIRS: Reliable, Safe & Effective/ kidney stone
- Technique of RIRS is now well established due to
  - Development of effective F-URS
  - Specific Instrumentat° (new grasping devices)
  - Efficient laser
- Lower Pole Stone is a special indication
- The challenge in the ensuing years is to refine technique and patient selection for the growing list of endourologic options
- Multicenter Prospective Randomized Studies are needed
THANK YOU FOR YOUR ATTENTION

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smquro@yahoo.com