UPJO: What to use when and why?

• What are we talking about?
  – Selecting the appropriate procedure for UPJO
    • Minimal invasive, high success, durable result
  – Technique of retrograde approach
  – Long-term outcomes and current role of the retrograde URS/RIRS for UPJO treatment

UPJ Obstruction

Decision making in treatment selection:

New onset vs. Chronic hydro
Degree of hydronephrosis and renal function
Crossing vessel/s (impact on UPJ; extrinsic/intrinsic)
Concomitant stone disease
Concomitant medical problems

UPJ Repair

Treatment Options

Retrograde Intraluminal Repair:
  Balloon (Acucise)
  Ureteroscopic (RIRS)

Percutaneous Intraluminal: PCN surgery

Pyeloplasty: Laparoscopy, Open Surgery

UPJ Obstruction

Treatment Selection

<table>
<thead>
<tr>
<th>Gross hydro &lt; III</th>
<th>Retrograde Intraluminal Methods (+ RIRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not chronic</td>
<td></td>
</tr>
<tr>
<td>No stone (or &lt; 1.0 cm)</td>
<td></td>
</tr>
<tr>
<td>Gross hydro &lt; III</td>
<td>Antegrade Intraluminal</td>
</tr>
<tr>
<td>Not chronic</td>
<td></td>
</tr>
<tr>
<td>Stone &gt; 1.0 cm</td>
<td></td>
</tr>
<tr>
<td>Gross hydro &gt; III</td>
<td>Laparoscopic or open repair</td>
</tr>
<tr>
<td>vessels Chronic</td>
<td></td>
</tr>
<tr>
<td>With or without stone</td>
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</table>
UPJ Stenosis
A Review of 100 Cases

<table>
<thead>
<tr>
<th>Procedure</th>
<th>N</th>
<th>Stonefree</th>
<th>Patency</th>
<th>Hosp.stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ureteroscopy / RIRS</td>
<td>76</td>
<td>100% (12)</td>
<td>96%</td>
<td>&lt; 23 hrs</td>
</tr>
<tr>
<td>PCN / PCNL</td>
<td>3</td>
<td>100% (3)</td>
<td>100%</td>
<td>28 hrs</td>
</tr>
<tr>
<td>Laparoscopic surgery</td>
<td>21</td>
<td>80% (5)</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

URS-UPJ Incision
My “Ideal” Ureteroscope

- **Features & Advantages**
  - Access possibility without any dilation in 97%
    - Beveled tip facilitates access
    - 2 wire access for tighter orifices
- **Size:**
  - 9.5 Fr. "semi-rigid"
- **Optics:**
  - Fiberoptic, offset "lens"
- **Work channel:**
  - 5 Fr. straight
- **Accessories:**
  - All energy sources
  - Accepts rigid 4.7 Fr.

UPJ Results

<table>
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<tr>
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UPJ Obstruction
Retrograde Incision
Principle of Endoscopic Incision

- Visual control of site of incision
- Visual control of depth of incision
- RIRS management of small stone ≤ 1.0 cm or less
Holmium Laser Endopyelotomy

**Operative Technique**
- Pass rigid ureteroscope over 2nd working wire which is used to tent open the UPJ.
- Pass Holmium laser fiber through work channel and extrude tip into renal pelvis in lateral position where the incision is to be made.

RIRS: *Endopyelotomy Step by Step*
- 10-15 W, Holmium
  - make the pouch
  - create the funnel

**UPJ Obstruction**
**Advantages of Endoscopic Incision**
- Visual control of site of incision (identification of extrinsic obstruction)
- Visual control of depth of incision

**Preferred Sites of Incision**
- Lateral
- Postero-lateral

*Excellent URS - endopyelotomy results ...*
**UPJO – Repair**

**Follow-up Protocol**

- Stented for 4 wks – then US and office stent removal
- 4 wks later: diuretic challenge with Lasix-IVP (matched with US in offc)
- 6 wks, 3 mos, 1 yr* later: Office US in asymptomatic pt (1 yr also Lasix-IVP)
- When change in US /symptoms: Lasix – IVP
- Role of nuclear scan?

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**Endopyelotomy for UPJO**

**Deterioration of Long-term Results**

- **Antegrade repair:**
  - Primary Success: 90 – 48 % (ave 75%)
  - Long-term Success: 86 – 30 % (ave 65%)
- **Retrograde repair:**
  - Primary Success: 96 – 40 % (ave 72%)
  - Long-term Success: 85 – 30 % (ave 64%)
- **Our Series:**
  - 96 % to 78 % after 72 mos

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**Endoscopic Repair of UPJ**

**So what have we learned?**

- **Summary (old Version):**
  - Retrograde endoscopic incision is the treatment of choice for moderate hydro (no crossing vessels, stone < 10 mm)
- **Summary (new Version):**
  - Retrograde endoscopic incision is an option for select patients with mild/moderate hydro (no crossing vessels, no stone)

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**Endoscopic Repair of UPJ**

Retrograde endoscopic incision is a valid option for moderate hydro (no crossing vessels, stone < 10 mm)

PCN surgery is an option for same group but larger stone burden (> 10 mm)

Laparoscopic repair of UPJ is indicated in more complex cases of UPJ obstruction (chronic gross hydro, vessels compromising UPJ, +/- stones)
Endoscopic Repair of UPJ
So what have we learned?

• Summary (old Version):
  - PCN surgery is the treatment of choice for moderate hydronephrosis and larger stone burden (> 10 mm)

• Summary (new Version):
  - PCN surgery is an option for moderate hydronephrosis with stone burden (> 10 mm)

Endoscopic Repair of UPJ

Endoscopic repair of the UPJ with and without stones is the treatment of choice for most patients (URS/PCN/Laparoscopy).

Careful patient selection for the different treatment modalities is paramount for assuring lasting success.

Laparoscopic surgery appears to have the best long-term results and is utilized more frequently as first-line treatment.

Open surgery should be very rarely indicated.

RIRS and Intrarenal Strictures

• Stones trapped under fibrin after failed SWL
• Stones and MSK / nephrocalcinosis
• Stones in Renal Diverticuli

RIRS for “the hidden LC stone”

46 yr old male with left lower caliceal stone s/p E-SWL x 3;
Stone looks fragmented BUT no stone passage presently asymptomatic
airline pilot (grounded for 5 months)

Retained Stones after ESWL (Arthur Smith’ theory)

RIRS for “the hidden stone”
Medullary Sponge Kidney
A Special Case of Intrarenal “Stricture”

RIRS for Caliceal Diverticuli
Material and Methods

- **SELECTION CRITERIA:** 96 patients with proven stones in caliceal diverticuli on IVP or retrograde pyelogram (RPG)
- **AGE RANGE:** 21 - 75 yrs. (Ave. 47 yrs)
- **SEX:** Male 39 Female 53

- **STONE LOCATION:**
  - Upper Calyx: 53 pts.
  - Mid Calyx: 33 pts.
  - Lower Calyx: 8 pts.
  - Two patients mid and lower caliceal stones.

Stones in the Caliceal Diverticulum

- **Objectives of my talk:**
  - Present 24 + yrs experience with retrograde intrarenal surgery (RIRS):
    - technique, outcomes, limitations
  - Present practical treatment algorithm for total MIS management of stones and intrarenal strictures
    - RIRS, PCN, Laparoscopy

RIRS for renal tics– the initial experience 1987

- Sterile urine
- Flexible cystoscopy and RPG to assess intrarenal architecture and confirm presence of diverticulum
- Placement of double J stent to allow for gradual passive dilation of upper tract (1-2 weeks prior to RIRS)
- Re-culture urine 1 week prior to treatment
- Start antibiotics p.o. 2 - 4 days before Rx. (if indicated)
RIRS Patient Preparation

- Placement of double J stent to allow for gradual passive dilation of upper tract (1-2 weeks prior to RIRS)
- **1 stage procedure (since 1992):**
  - 9.5 Fr. "optical dilation" + 7.5 Fr. RIRS

RIRS for Intrarenal Strictures

Technique

- Dilute contrast is injected through the scope to delineate the connection to the stone bearing calyx.
- Methylene blue also helpful (when tic takes on contrast)

RIRS for Intrarenal Strictures

Technique

- A small dimple can usually be seen endoscopically.
- This indicates the entry point to the narrow caliceal neck.

RIRS for Intrarenal Strictures

Technique

- An 0.038 guidewire (or glide-wire) is inserted and maneuvered through the narrow segment under endoscopic and fluoroscopic guidance.

RIRS for Intrarenal Strictures

Technique

- A balloon dilator is advanced over the guidewire (1987 – 92).
- Alternatively, the calyeal neck is incised with the Bugbee electrode (92-94) or Holmium laser (since 94)

RIRS for Intrarenal Strictures

Technique

- Once the calyceal neck is opened, the diverticulum is inspected with the flexible ureterorenoscope.
RIRS for Intrarenal Strictures

Current Options for Stone Removal

- **Direct removal** of the stone (small stone, calyx spacious enough to allow for basket or three-prong grasper manipulation)
- **Fragmentation** of a stone slightly too large for direct removal (Holmium, EHL)
- **RIRS assisted ESWL** with active removal of stone debris during SWL procedure.

RIRS for Intrarenal Strictures

**After Care**

- Placement of indwelling stent
- The double J stent is preferentially placed into the stone bearing calyx if space permits
- Discharge home same day with Abx (5 days)
- The double J stent is left indwelling (proximal curl in diverticulum) for 2 weeks.

RIRS for Caliceal Diverticuli

**RESULTS**

- Access to kidney: **100%**
- Identification of infundibulum: **95%**
- Successful dilation/incision: **95%**
  - Balloon **36%**
  - Incision (Holmium Laser, electrode) **59%**
  - Combination **5%**

**Dilation/Incision:**

- unsuccessful in 4/8 cases of lower pole diverticuli (PCNL done, same session)
- not enough fulcrum to negotiate balloon
- in 3 cases (lower pole) electrocautery incision was used to open the caliceal neck

**Stone retrieval:**

- Endoscopic grasping/basket: **75%**
  - Stonefree **90% (tie 100%)**
- RIRS assisted ESWL: **20%**
  - Stonefree **75% (tie 100%)**
- Primary PCNL: **5%**
  - Stonefree **100%**
- Secondary RIRS (after ESWL): **2.5%**
  - Secondary PCNL **2.5%**
RIRS for Intrarenal Strictures

Conclusions
- 18% of patients had recurrence over a 10 year observation period.
- 24+ years of follow-up confirms that this treatment approach compared favorably to percutaneous renal surgery with regard to stone-free rates, long-term resolution of symptoms, re-stenosis of the caliceal neck and stone recurrence rates.

Caliceal Diverticulum

Role of Laparoscopy
- Anterior location
- Large stone burden

38 yr. old female with relapsing UTI, PN left and flank pain

Laparoscopic removal of 8 stones with fulguration of mucosa and interposition of perirenal fat

RIRS for Intrarenal Strictures

Conclusions
- Limited success of E-SWL monotherapy 30%
- RIRS correction of the outflow alteration, with or without ESWL, has proven to be the better alternative
- PCNL treatment of stones in caliceal diverticuli with similar success yet higher complication rate

RIRS for Intrarenal Strictures

Conclusions
- Retrograde endoscopic repair + stone removal yields a 90% stonefree rate compared to 75% for endoscopic repair + ESWL (tie 100% free of stone).
- This approach is preferable for stones in the mid and upper calyces
- PCNL is used for lower pole calyceal diverticuli and RIRS failures

RIRS is the choice for the majority of caliceal diverticula (upper pole, mid renal, anterior/posterior w/o large dependant portion.)

PCNL is the choice for large posterior diverticula in the lower pole or RIRS failures (posterior location)

Laparoscopy is the choice for large anterior diverticula with large stone burden or when partial nephrectomy is needed

Caliceal Diverticulum