CONTROVERSIES IN PCNL

- Antibiotics
- Endoscopic-guided access
- Prone Position
- Upper calyx puncture
- Single puncture
- Maxi-Perc
- Tubeless
PCNL FOR RENAL STONES: WHEN?

STONE SIZE
>15MM

Y  N

Anticoagulation
Pleura on CT
Morbidly obese

Y  Y

Anticoagulation
HU >1200
STSD >12 CM
LP 10-15mm

N  N

PCNL  URS  SWL
Anatomical considerations favoring PCNL

- Infundibular stenosis
- Calyceal tic
- Horseshoe / Pelvic / Ectopic
- UPJO
- Urethral stricture
- BPH
- Ureteral stricture
Percutaneous Nephrolithotomy (PCNL)

4 of 1000 patients DIE from PCNL

WHY?
Sepsis

SEPSIS after PCNL and URS

- LIJ
- Preoperative predictors of sepsis after PCNL and URS
  - bladder outlet obstruction (OR 6.4)
  - positive pre-operative urine culture (OR 6.7)
  - indwelling nephrostomy tube (OR 6.4).
- Treatment of a positive preoperative urine culture did not reduce the risk of sepsis, and cannot be considered a reliable preventative measure.

(Abstract 1548)
Stone / Pelvis Culture

- 37% of pts – SIRS after PCNL
  - 4x higher risk if positive stone culture or positive pelvis aspirate
  - Bladder culture not predictive
MP20-14 ANTIMICROBIAL UTILIZATION PRIOR TO ENDOUROLOGICAL SURGERY FOR UROLITHIASIS: ENDOUROLOGICAL SOCIETY SURVEY RESULTS

Adam Kaplan

The Journal of Urology
DOI: 10.1016/j.juro.2015.02.986
STRUVITE STONES:

Positive Urine Culture for Urea-splitting organism

- Preop 31%
- 12 months 58%

Positive stone culture 69%

Urea-splitting organism 29%
Non-RCT – Ciprofloxacin 250 BID x 7 days

RCT – Macrodantin 100mg BID x 7 days

% Of Pts

Pelvic Culture  Stone Culture  SIRS  Serum endotoxin

Macrodantin  Control

- 1 wk Nitrofurantoin vs 24h (34 pts per arm)
- No advantage 1wk abx in low risk pts
- < 24 hr peri-operative abx as per AUA Best Practice Statement sufficient
Antibiotic Options

- Follow the guidelines
- **Individualize approach**
  - 1 week for:
    - Recurrent UTIs
    - Indwelling catheters
    - Neurogenic Bladders
    - Pyuria
    - Struvite
- Treat everyone with 1 week of antibiotics
Prone Split-Leg Position
63 yo
MH work-up
Cysto negative
PMH HTN and DM
CR 0.89
Endoscopic vs. Fluoroscopic PCNL

- Fluoro Time (min)
  - Endoscopic: 20 min
  - Fluoroscopic: 25 min

- Secondary procedures (%)
  - Endoscopic: 5%
  - Fluoroscopic: 10%

- Abort due to bleeding (%)
  - Endoscopic: 2%
  - Fluoroscopic: 3%

160 patients
Access

- Align with the pathology
  - Avoids the need for aggressive torquing
SUPINE PCNL

- IRAN  Haghighi et al.  17
- ROMANIA Bucuras et al.  100
- ITALY Poggio et al.  212
  - * 34% simultaneous URS
  - * 91% lower calyx
- SPAIN J.M. Sanchez-zalabardo et al.
  - 25 year experience – 818 patients
    - Colon Perforation 1
    - Failure caliceal puncture 15

No of Pts.
RADIOGRAPHIC COMPARISON OF PRONE VS. SUPINE PERCUTANEOUS NEPHROLITHOTOMY
N. Waingankar, Z. Okhunov, A.D. Smith, Z. Okeke
New York, USA

- 20 patients – prone and supine CT
- Supine position leads to:
  - Longer tracts
    - 2 cm longer
  - Narrower angles of instrumentation due to kidney lying more medially and relationship to bowel
The Effect of Prone-Flexed Positioning (PFP) on Airway Pressures During Percutaneous Nephrolithotomy (PCNL)

K Foell, M Ordon, T Alzahrani, AG Lantz, KT Pace, RJD’ A Honey
Division of Urology, St. Michael’s Hospital, University of Toronto, Canada

- 63 patients
- All PAP < 40 cmH₂O
- No patients required repositioning for anesthetic or other reasons
DOES IT SAVE TIME?
IS THERE LESS RISK OF COMPRESSION, LESS NEED FOR PADDING?
IF THE PATIENT NEEDS REINTUBATION OR CPR......?
PRONE vs. SUPINE POSITION

- Data base from the CROES study: 5803 patients
- Prone position is more utilized: 4637 (80.3%)
- Surgical time was significantly less in favor of prone position: 82.7 vs. 90.1 minutes
- Stone free rate was significantly better in favor of prone position: 77.0 vs. 70.2
- Prone position presented a higher incidence of bleeding: 6.1 vs. 4.3 and fever: 11.1 vs. 7.6
- *Election of the position must be determined considering the characteristics of each patient and the surgeon preference*

Valdivia JG., CROES., J. Endourol., 25, 2011
Of RCTs included
- n = 336 prone, 333 supine
- No significant difference in SFR, transfusions, complication rate, or hospital LOS
- Shorter OR time in supine
- CAREFULLY SELECTED PTS (BMI < 30, stones deemed needing single access site)
UPPER POLE FOR EVERYONE

- 2012-2016
- 462 Patients
  - Supracostal
  - Upper calyx
  - Tubeless
  - Endoscopic guided
- Thoracentesis / Chest tube 3.2%
- Transfusion Rate 4.3%
**PD30-5 PCNL**

- Multivariable Cox Regression Predictors for Transfusion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-operative Multivariate Hazard Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative hemoglobin</td>
<td>HR 0.81 (0.64-1.03) p=0.085</td>
</tr>
<tr>
<td>Bilateral PCNL</td>
<td><strong>HR 4.43 (1.65-11.89) p=0.003</strong></td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>HR 3.15 (0.97=10.20) p=0.056</td>
</tr>
</tbody>
</table>
The "mini-perc" technique: a less invasive alternative to percutaneous nephrolithotomy.

Jackman SV¹, Docimo SG, Cadeddu JA, Bishoff JT, Kavoussi LR, Jarrett TW.

Author Information

Mini-percutaneous antegrade endopyelotomy.

Monga M¹.

Mini-percutaneous nephrolithotomy.

Monga M¹, Oglevie S.
RENAL PARENCHYMAL INJURY AFTER STANDARD AND MINI PERCUTANEOUS NPHROSTOLITHOTOMY

OLIVIER TRAXER, THOMAS G. SMITH III, MARGARET S. PEARLE, T. SPARK CORWIN, HUSSEIN SABOORIAN, JEFFERY A. CADEDDU

**Graph:**

- **Scatter Volume (cc):**
  - 11F
  - 30F

- **Fractional parenchymal loss (%):**
  - 11F
  - 30F

---

Small burden lower pole calculus - Hard

Courtesy: Professor Mahesh Desai
## Nadiad Experience - LP

<table>
<thead>
<tr>
<th></th>
<th>Mini-PCNL (n=87)</th>
<th>Micro-PCNL (n=44)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stone size</strong></td>
<td>13mm</td>
<td>11mm</td>
</tr>
<tr>
<td><strong>Hounsfield Units</strong></td>
<td>1263</td>
<td>1303</td>
</tr>
<tr>
<td><strong>OR time</strong></td>
<td>57 min</td>
<td>59 min</td>
</tr>
<tr>
<td><strong>Stone-Free</strong></td>
<td>100%</td>
<td>90%</td>
</tr>
<tr>
<td><strong>Hospital stay</strong></td>
<td>2.8 days</td>
<td>3 days</td>
</tr>
</tbody>
</table>

*Courtesy: Professor Mahesh Desai*
Intrarenal pelvic pressure

Comparison of intrarenal pelvic pressure during micropercutaneous nephrolithotomy and conventional percutaneous nephrolithotomy

Authors

Abdulkadir Tepeler, Telga Akman, Mesrut Selcuk Silay, Muzaffer Akcay, Ceyper Ersoz, Senad Kalkan, Abdullah Armanan, Kemal Sarica

<table>
<thead>
<tr>
<th></th>
<th>Conventional PNL</th>
<th>Microperc</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>8.7 ± 2.4 (4.5–11.4)</td>
<td>12.2 ± 2.5 (9.02–16.5)</td>
<td>0.005</td>
</tr>
<tr>
<td>Fragmentation</td>
<td>15.3 ± 3.5 (9.02–21.05)</td>
<td>22.1 ± 3.3 (18.2–28.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Irrigation</td>
<td>20.1 ± 3.1 (15.03–26.8)</td>
<td>30.3 ± 3.9 (25.6–37.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>End</td>
<td>8.9 ± 1.9 (5.26–11.2)</td>
<td>11.3 ± 1.8 (9.5–15.03)</td>
<td>0.011</td>
</tr>
</tbody>
</table>
## Porcine Model of PCNL E Coli Infusion

<table>
<thead>
<tr>
<th></th>
<th>&quot;Mini&quot; arm 10F sheath (ID) 7.5F scope</th>
<th>&quot;Standard&quot; arm 30F sheath (ID) 24F scope</th>
<th>p=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean intra-pelvic pressure (mmHg)</td>
<td>18.76 mmHg ± 5.82</td>
<td>13.56 mmHg ± 5.82</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Median time spent above 30mmHg (sec)</td>
<td>116.99 sec [98.02-165.53]</td>
<td>66.07 sec [33.44-109.08]</td>
<td>p=0.0452</td>
</tr>
<tr>
<td>Positive cultures:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Kidney</td>
<td>10/10</td>
<td>10/10</td>
<td></td>
</tr>
<tr>
<td>- Spleen</td>
<td>10/10</td>
<td>6/10</td>
<td>p=0.0253</td>
</tr>
<tr>
<td>- Liver</td>
<td>9/10</td>
<td>3/10</td>
<td>p=0.0062</td>
</tr>
<tr>
<td>- Blood culture</td>
<td>3/10</td>
<td>0/10</td>
<td>p=0.0603</td>
</tr>
</tbody>
</table>
Miniperc? No, Thank You!

Guido Giusti *, Alessandro Piccinelli, Gianluigi Taverna, Alessio Benetti, Luisa Pasini, Matteo Corinti, Alessandro Teppa, Silvia Zandegiacomo de Zorzi, Pierpaolo Graziotti

Department of Urology, Istituto Clinico Humanitas, IRCCS, via Manzoni 56, 20089 Rozzano, Milan, Italy

- SFR 77.5% in Mini group compared to 94% and 100% in standard and tubeless groups
- Mini-perc OR time ~50 min longer
- Less hgb drop and fewer transfusions in mini group
  - 3 transfusions in standard + tubeless group, 0 mini
- Hospital LOS comparable
Tubeless PCNL

- 1997 - Dr. Gary Bellman.
- Meta-analysis tubeless vs. conventional percutaneous nephrolithotomy
  - 621 patients in 10 randomized clinical trials.
  - all studies excluded patients with significant intraoperative bleeding, residual stone or major collecting system injury.
  - No significant difference in hemoglobin drop or post-op fever.
  - Length of hospitalization shorter (1.4 days)
  - less post-operative analgesic requirements

J Endourol 24: 1739, 2010
PERCUTANEOUS DRAINAGE
Tubeless Surgery

- Cochrane Review
- 11 randomized studies
- 13 retrospective and prospective studies
- < pain
- < analgesic requirements
- < hospital stay
- improved convalescence
- Morbidity and stone free rates similar

Urologia Internationalis, 88:373, 2012

Courtesy Jorge Gutierrez-Aceves, AUA2015 Decade of PCNL
Tubeless percutaneous nephrolithotomy: outcomes with expanded indications.

Isac W¹, Rizkala E¹, Liu X¹, Noble M¹, Monga M¹.

Author information
1 Glickman Urological & Kidney Institute, The Cleveland Clinic, Cleveland, USA.
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Summary

- Endoscopic-guided access
- Prone Position
- Upper calyx puncture
- Single puncture with Flex Endo
- Maxi-Perc
- Tubeless