

Management of the Small Renal Mass

Frank Keeley



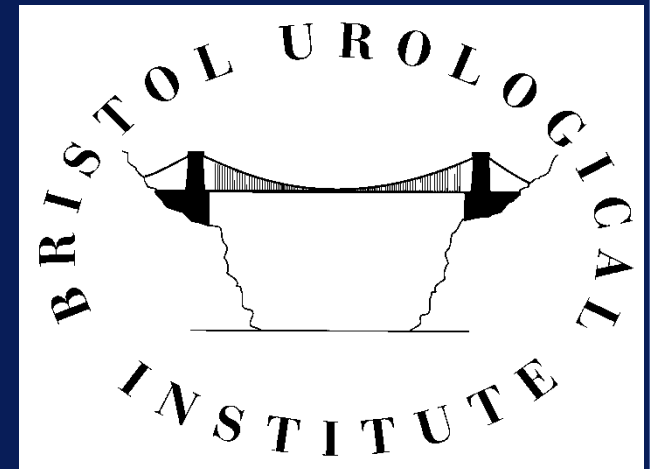
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From Philadelphia...





...to Bristol, England



Southmead Hospital, 1916

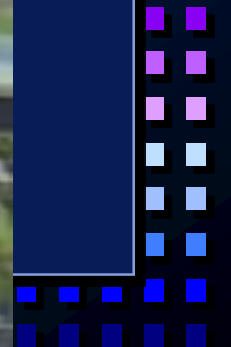
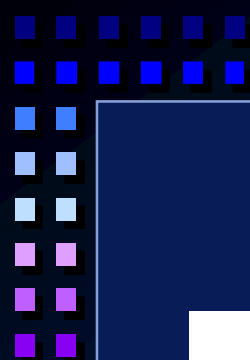


Southmead Hospital, 2013



SOUTH MEAD HOSPITAL
SOUTHMEAD BRISTOL. 1895.

Southmead Hospital, 2014





Management Options for SRMs

- Observation
- Radical nephrectomy – open or laparoscopic
- Partial nephrectomy – open, lap or robotic
- Needle ablative therapy



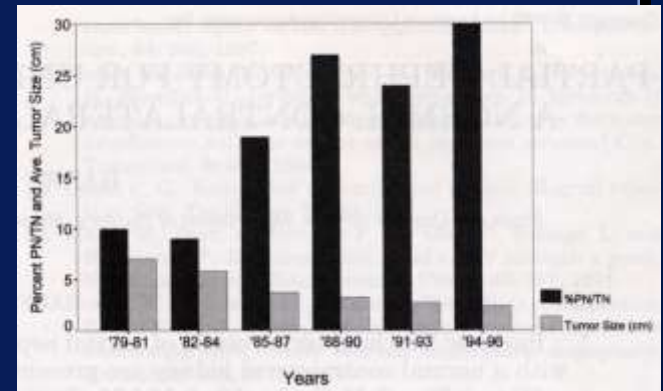
Laparoscopic Radical Nephrectomy

- Standard of care in UK
- Transperitoneal or Retroperitoneal
- Indications: up to 15 cm



Is Laparoscopic Radical Nephrectomy Overtreatment?

- Earlier detection
- Smaller tumors
 - Lower stage
 - Lower grade
 - Better prognosis
- Nephron-sparing surgery



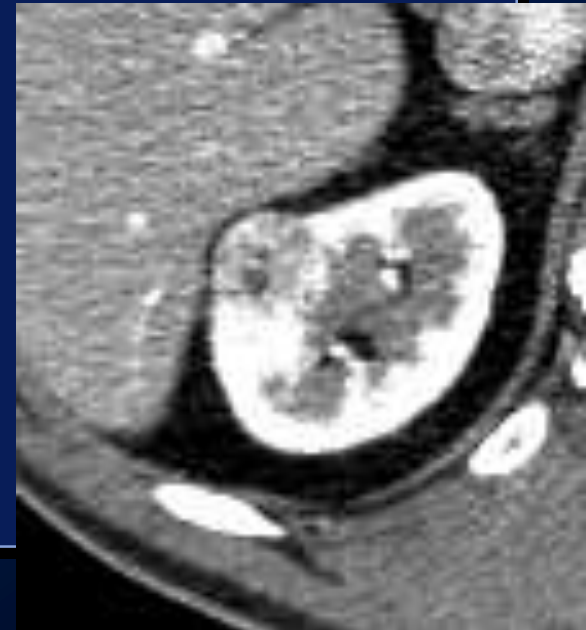
Herr, J Urol 1999



Why Nephron-Sparing?

- High number of benign lesions removed (up to 28%)
- Risk of chronic renal insufficiency in up to 22%

Lau et al. Mayo Clinic Proc. 2000



Nephrectomy and Renal Function

- An eGFR <60 is an independent risk factor for...
 - development of cardiovascular disease
 - number of hospitalizations
 - premature death
- ...even in patients not needing renal replacement therapy

Advantages of Partial Nephrectomy

- After partial rather than radical nephrectomy:
 - less decline in eGFR¹ or rise in serum creatinine²
 - A lower risk of progression to renal failure³
 - There may be reduced cardiovascular or even overall mortality, but studies conflict^{4,5}
 - The only RCT showed lower OS in partial group⁵
 - Remains a controversial area

1 Huang et al 2006

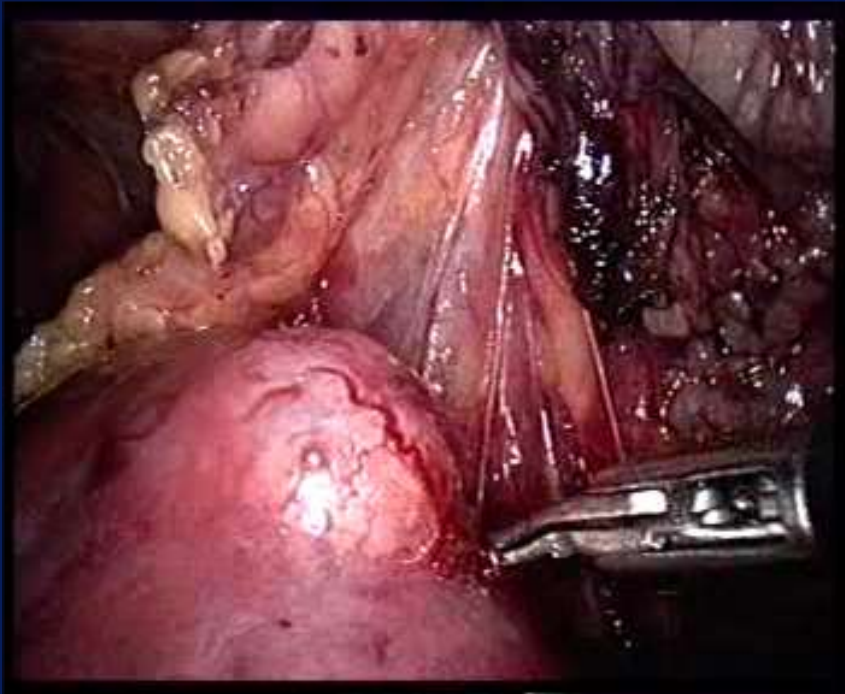
2 McKiernan et al 2002

3 Klarenbach et al 2011

4 Huang et al 2009

5 Van Poppel et al 2011

Nephron Sparing Surgery: Issues



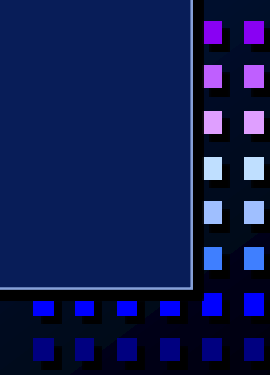
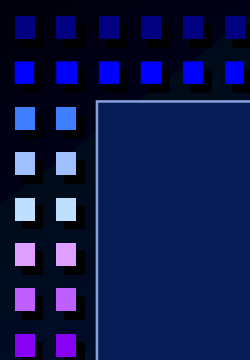
- Disease control
- Renal function
- Morbidity
- Complications

Open Partial Nephrectomy: Loin Incision

- Painful
- Loin bulge in up to 50%
- Atrophy of rectus muscle
- 67% notice bulge
- Return to work
- Can this be avoided?

Chaterjee et al Urol Oncol 2004



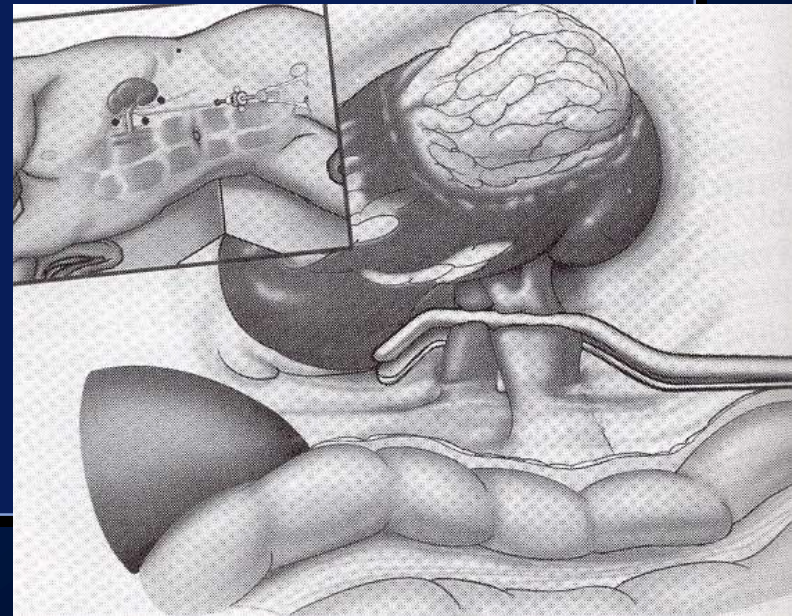


Measuring Outcomes

- Oncological: negative margins, recurrence rates, MFS, CSS
- Function: WIT < 25 minutes
- Safety: no complications
- If all true = trifecta
- Depends on case selection and technique
- Blood loss correlates to outcomes
- Ischemia vs margins/complications

Laparoscopic Partial Nephrectomy: Issues

- Difficult technique
- Difficult to suture
 1. Margin
 2. Warm ischemia
 3. Complications

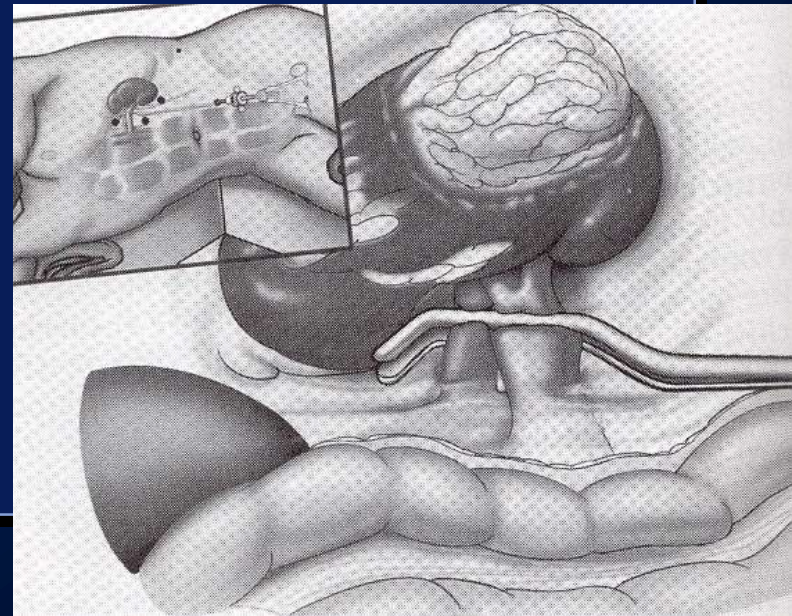


Lap/Robotic Partial: Technical Limitations

- Limited hemostasis
- Limited blunt dissection
- Enucleation difficult if not impossible
- Vision limited due to bleeding
- Effect on margins & complications?

Laparoscopic Partial Nephrectomy: Issues

- Difficult technique
- Difficult to suture
 1. Margin
 2. Warm ischemia
 3. Complications



Functional outcome: Renal damage

- Several studies have attempted to establish what is the cut off time beyond which ischemia can lead to irreversible renal damage
 - Porpiglia F et al. Eur Urol 2007 → 30 min
 - Becker F et al. Eur Urol 2009 → 20 min
 - Thompson R et al. Eur Urol 2010 → 25 min
- Problem: Many lap partial series report WIT > 30 minutes

At What Point Does Warm Ischemia Cause Permanent Renal Damage during Partial Nephrectomy?

R. Houston Thompson, Michael L. Blute*

EUROPEAN UROLOGY 52 (2007) 961-963

Resection without Ischemia: Technique

- Renal artery and vein isolated
- Tumor excision, simultaneous hemostasis
- Hemostasis:
 - Bipolar or monopolar/harmonic scalpel
 - Wet electrode/hydro jet/Thulium laser
- Sealing of cut surface:
 - Fibrin glue, FloSeal, Evicel
- BUT: poor view of edge of tumor
 - Margin difficult to judge
- Conclusion: 1 or 2 out of 3 (trifecta)



'Zero Ischemia'

- Selective branch microdissection of the renal artery/vein with intraoperative reduction of BP
- Risk of loss of vision at base of tumor
- Risk of complications from hypotension & microdissection
- EBL = 208 ml but transfusion rate = 20%?
- Trifecta: only ischemia is better; complications higher; margins questionable

Kidney Cancer

"Zero Ischemia" Partial Nephrectomy: Novel Laparoscopic and Robotic Technique

Inderbir S. Gill, Manuel S. Eisenberg, Monish Aron, Andre Berger, Osamu Ukimura, Mukul B. Patil, Vito Campese, Duraiyah Thangathurai, Mihir M. Desai*

Center for Advanced Robotic & Laparoscopic Surgery, USC Institute of Urology, Division of Nephrology and Department of Anesthesiology, Keck School of Medicine, University of Southern California, Los Angeles, California, USA

EUROPEAN UROLOGY 59 (2011) 128–134



Laparoscopic Partial Nephrectomy: Early Declamping

- Simple rationale: early declamping before the haemostatic step of the procedure or just after the continuous stitches on the surgical bed
- Mean WIT = 13.9 min vs 31 min (previous publications) $p < 0.0001$
- Conclusion: Trifecta more likely

Nguyen MM et al. J Urol 2008





Selective Ischemia



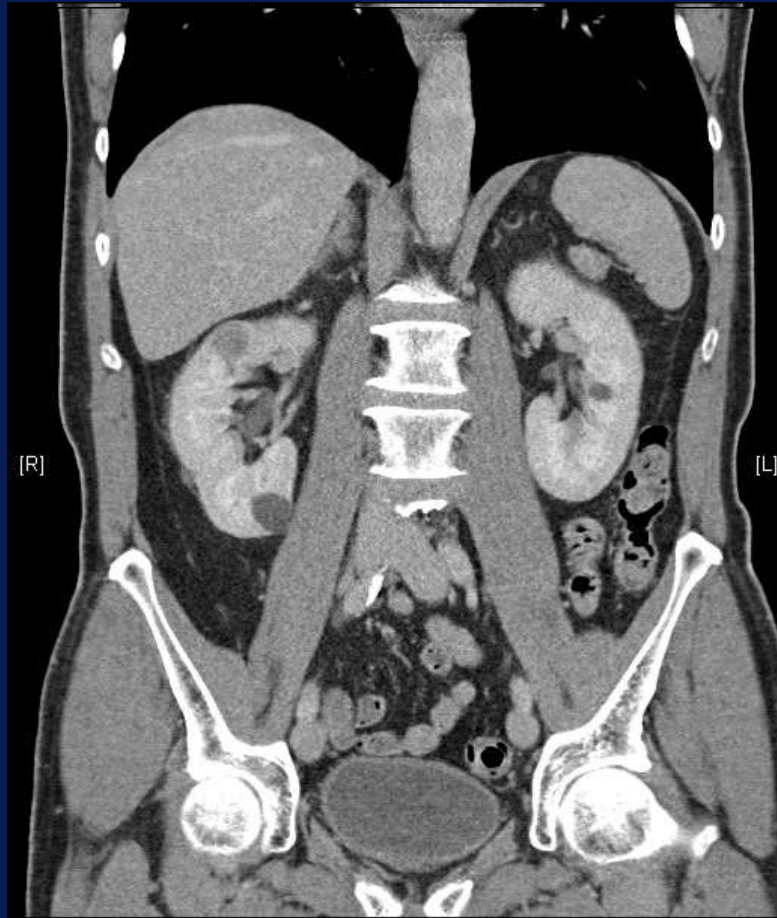
Hilar Tumor





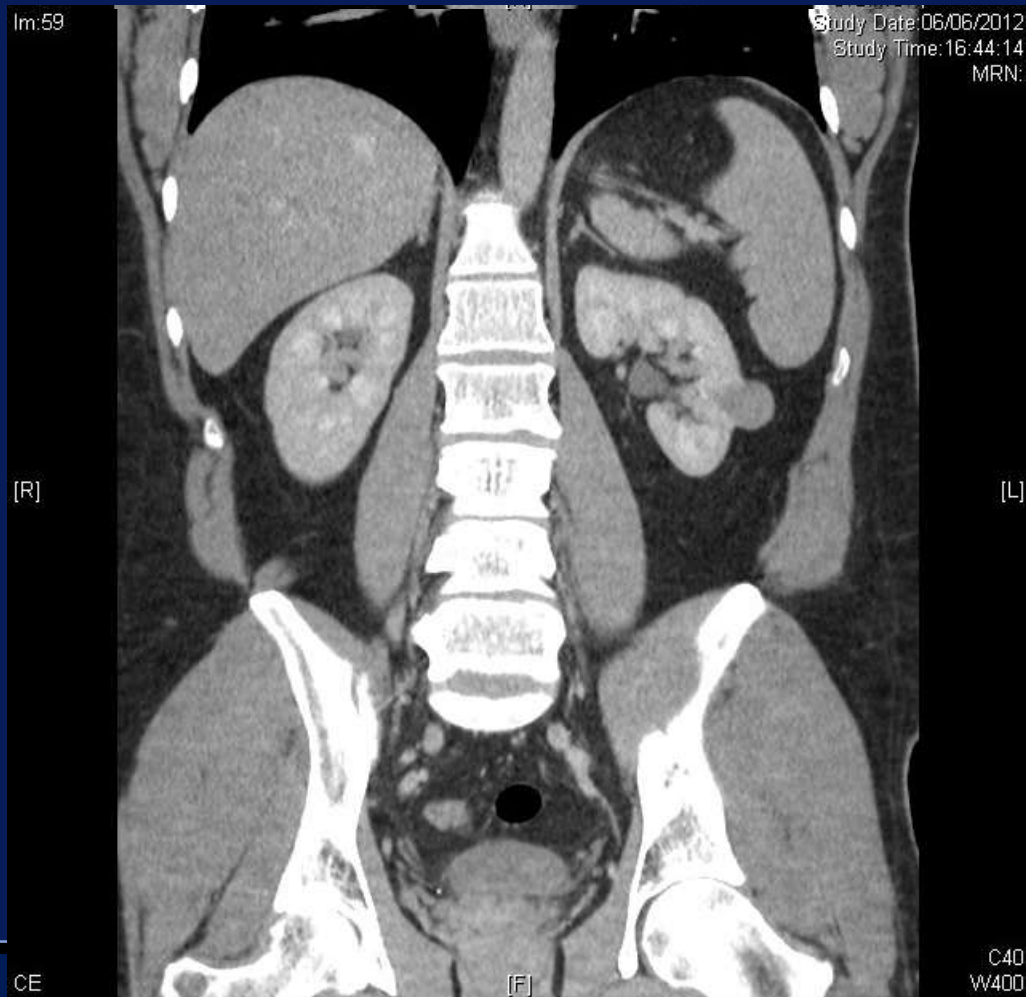
Hilar Tumor

Selective Clamping





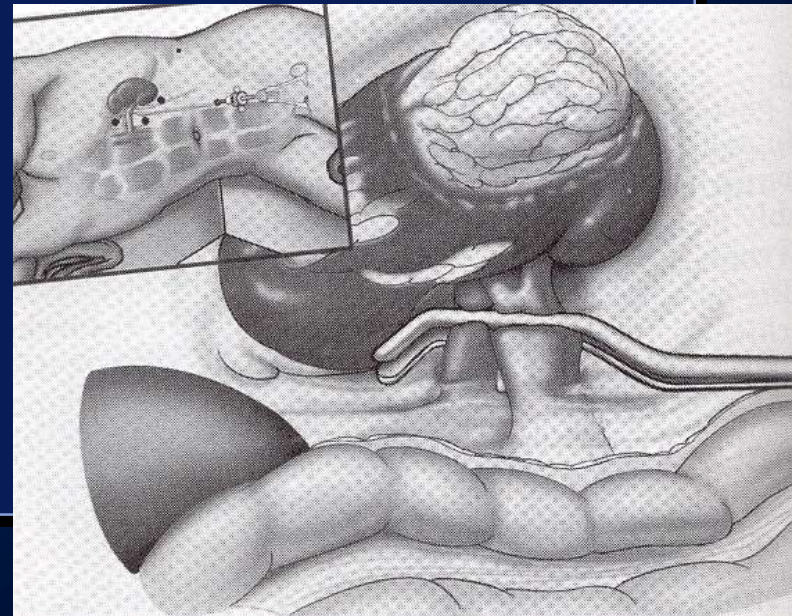
Non-Clamping in Selective Cases





Laparoscopic Partial Nephrectomy: Issues

- Difficult technique
- Difficult to suture
- Warm ischemia
- **Complications**



Complications of Lap PN

- Overall: 33%
 - Intraop.: 5.5%
 - Postop.: 12%
 - Delayed: 15.5%
- Bleeding: 9.5%
- Urine leak: 4.5%
- **Worse than open partial nx, but early series**
- Solution: Improve technique, case selection

Gill et al. 2005

Risk Factors for Complications

- 335 pts LPN; 23 (7%) required transfusion
- Age, tumor size, op time, HTN, DM, obesity, CRI, CHF all associated with bleeding
- ASA grade, smoker independent risk factors
- Conclusion: LPN safest in young, healthy patients
- Offer alternatives to older, unfit

Richstone et al. Urology 2011



Laparoscopic Partial Nephrectomy: Reproducible?

- Outside US, no Indy Gill
- No Mayo Clinic
- Few high volume centers
- Therefore...
- Higher complications?
- Worse results?

Laparoscopic Partial Nephrectomy: Solutions

- Simplify technique
- Limit warm ischemia time
- Better training
- High-volume centers

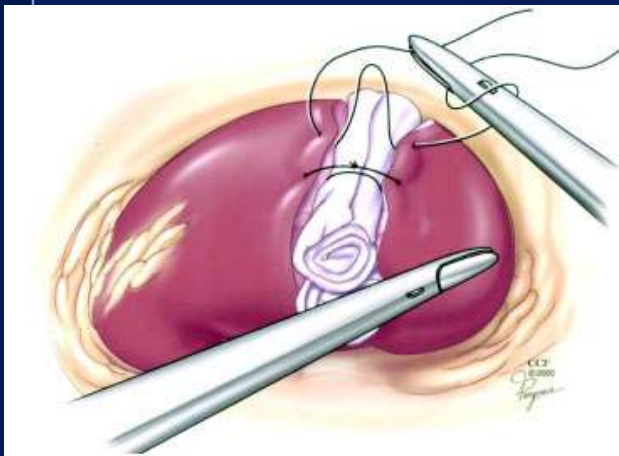
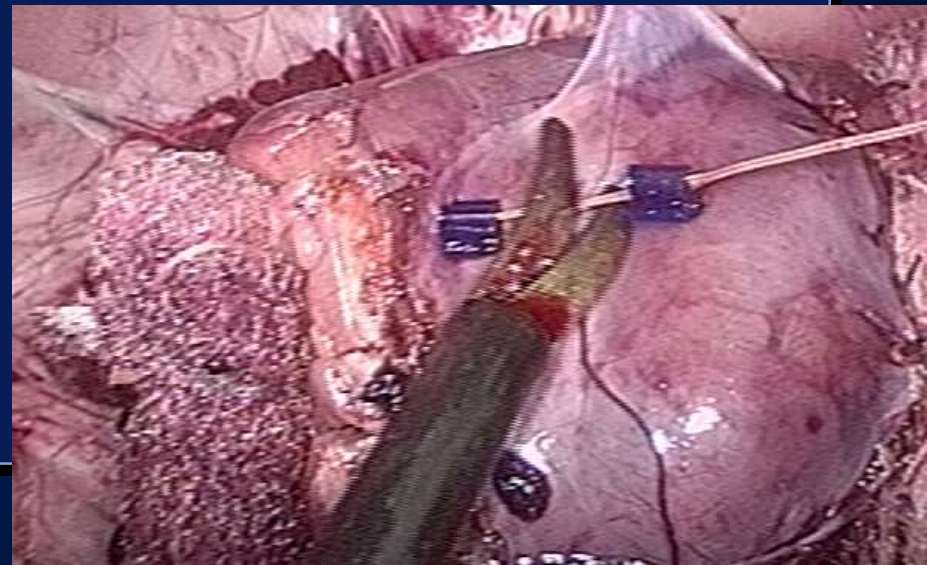


Figure 3 – Renal parenchymal repair over bolsters. Adapted from reference 10. (Reprinted with the permission of the Cleveland Clinic Foundation).



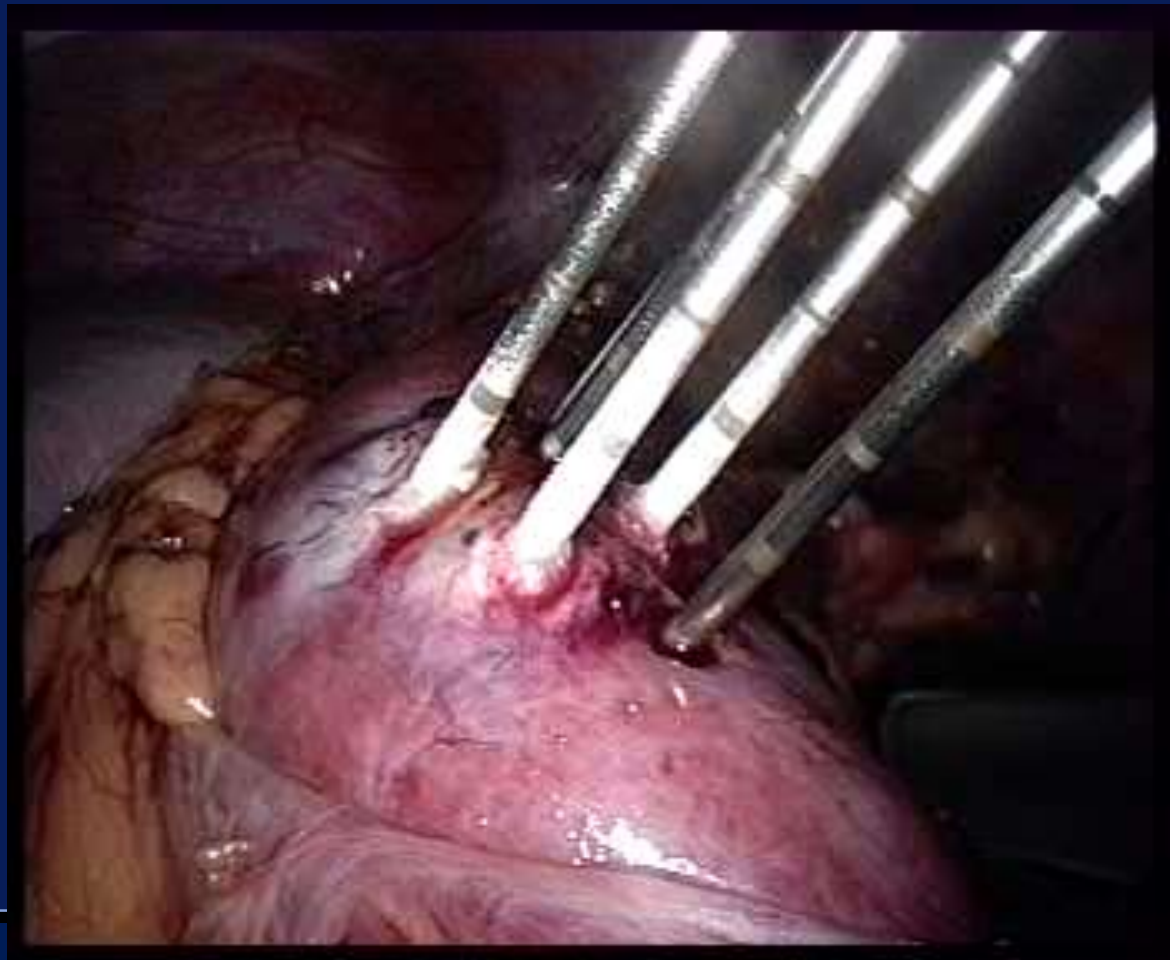
Evolving Technique: Bristol Experience

- 1998: Hand-assisted radical nephrectomy
- 1999: Standard laparoscopic radical nephrectomy
- 2003: Laparoscopic partial nephrectomy
- 2004: FloSeal to aid hemostasis
- 2006: Bolsters and clips instead of tying sutures
- 2009: V-lock suture
- 2010: Early declamping: Mean time now 12 minutes
- 2011: Selective or regional renal ischemia
- 2012: Robotic surgery (+ laparoscopic and open)
- Volume: now higher than radical

If You Plan to Start Laparoscopic Partial Nx...

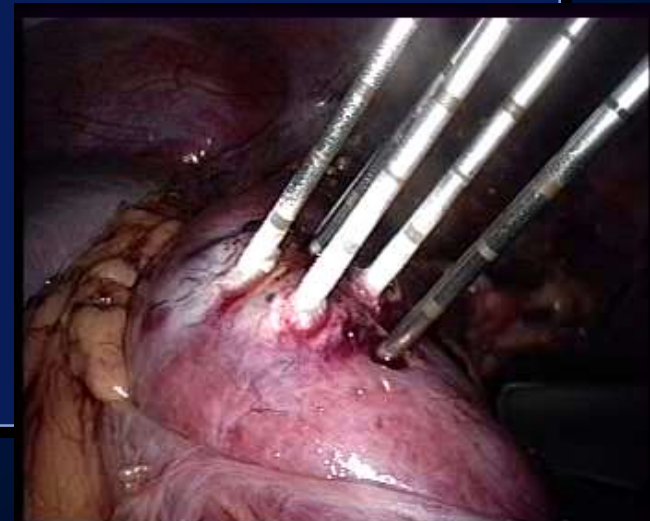
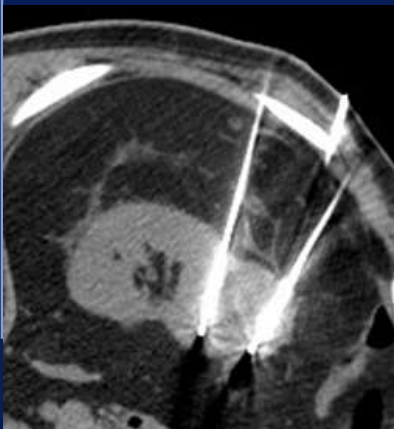
- You must be...
- Confident, high-volume laparoscopic surgeon
- Confident at laparoscopic suturing
- Know the technique inside and out
- You must have...
- Appropriate equipment & a good team
- You must...
- Choose cases carefully
- Have backup support in case of bleeding

Cryoablation



Why Needle Ablation?

- Cancer now subclinical...and getting smaller
- Smaller disease invites a different approach
-open to laparoscopic, poisoning to targeted molecular cell proliferators, conformal radiotherapy to 'cyberknife'
- Cryo suited to discrete rounded sub-4cm disease



Cryoablation: Overview

- Patient selection
- Outcomes
 - Functional
 - Oncological
 - Complications
- Patient selection (revisited)



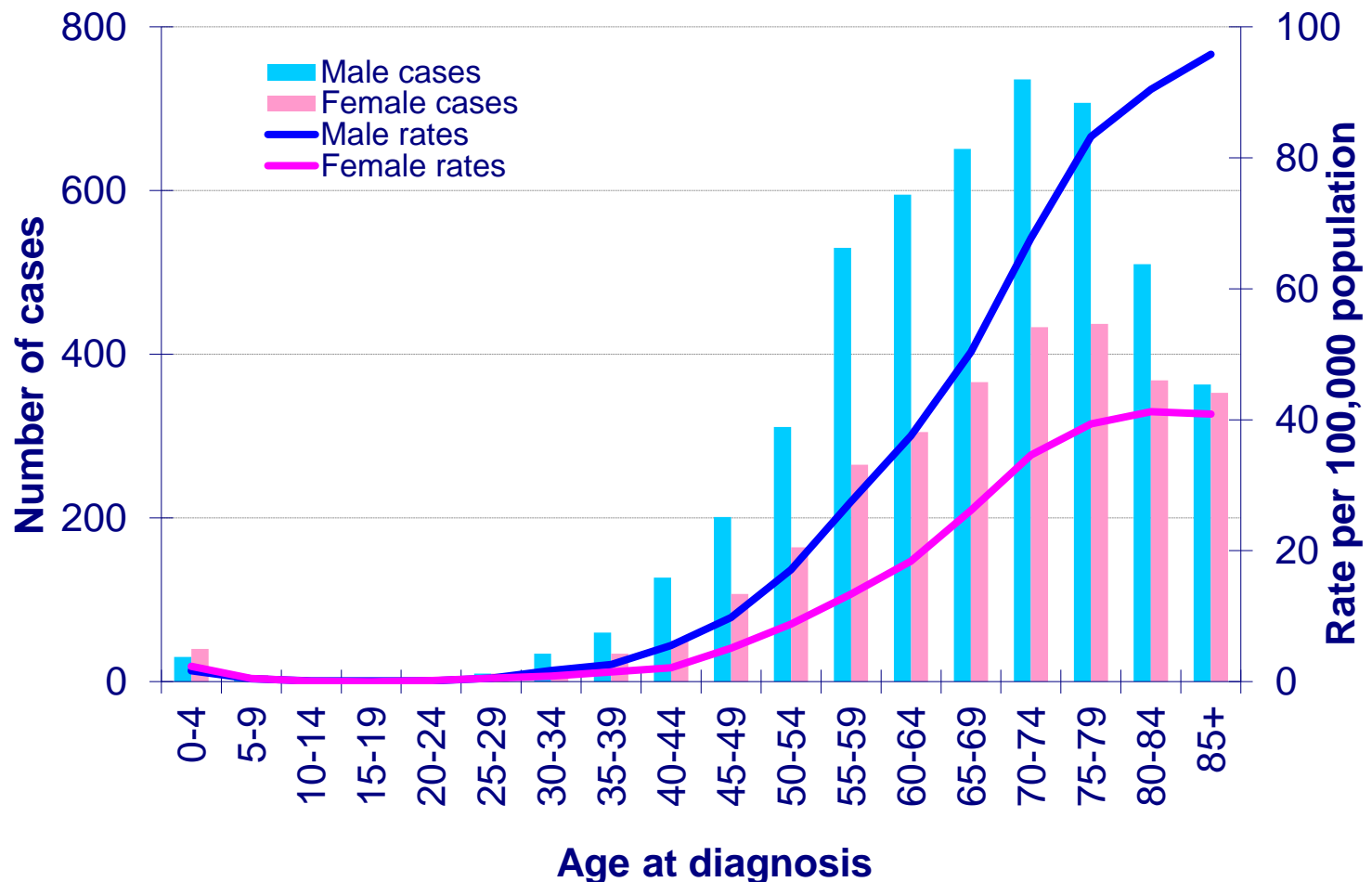
Patient Selection

- Typical Bristol patients with SRM
- Cryo considered only if unfit for partial



Highest Incidence: the Elderly

Figure 1.2: Numbers of new cases and age specific incidence

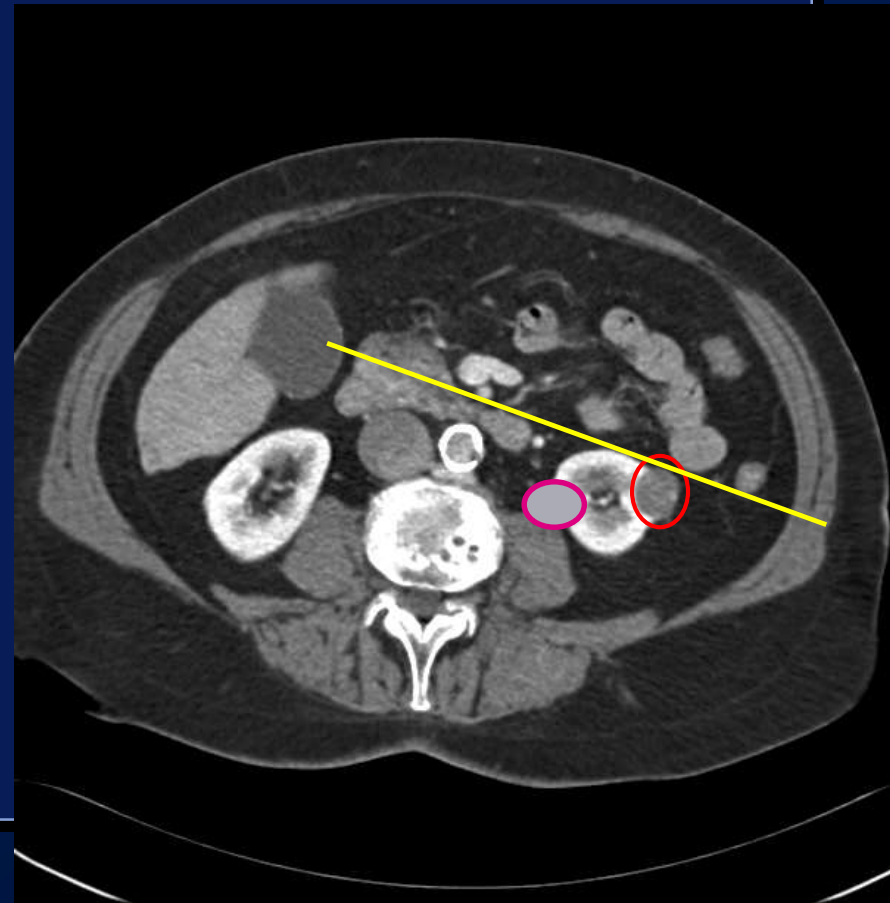


Effective Needle Ablation: Requirements

1. Must avoid collateral damage
2. Energy must be targeted accurately
3. Energy must induce reliable cell kill
4. Follow-up tests (imaging) must distinguish success from failure

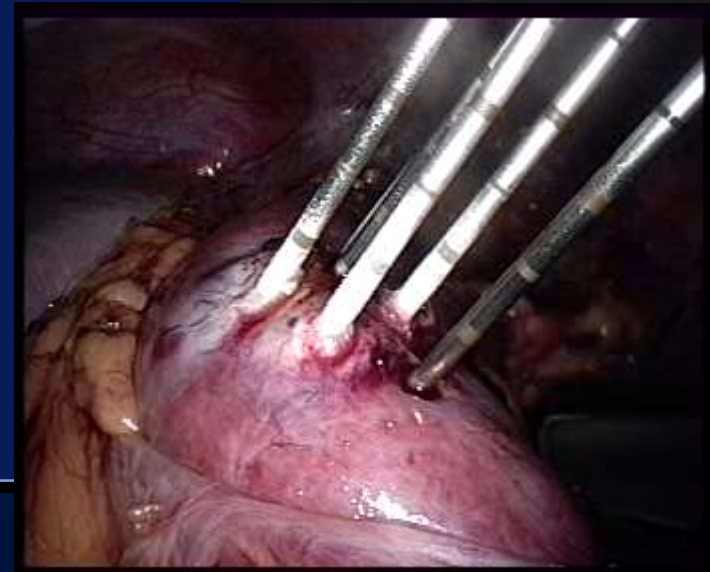
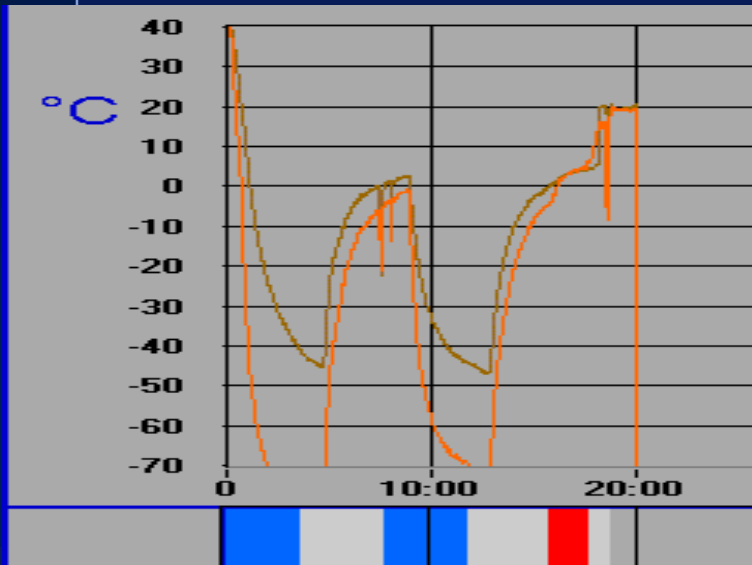
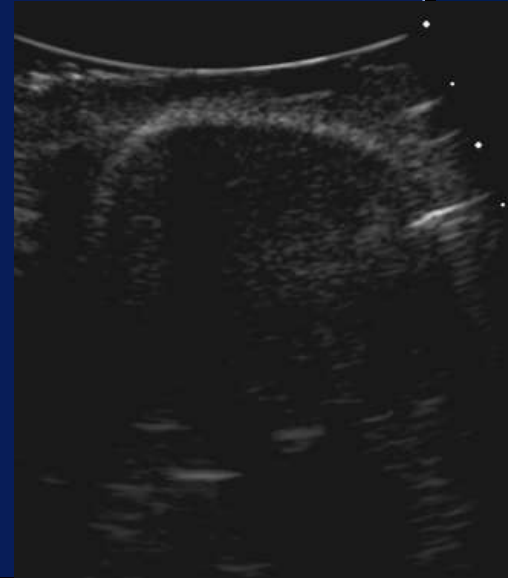
1. Avoid Collateral Damage

- Select patients depending on tumor site and size
- Preserve collateral structures
- No 'Skip lesions'



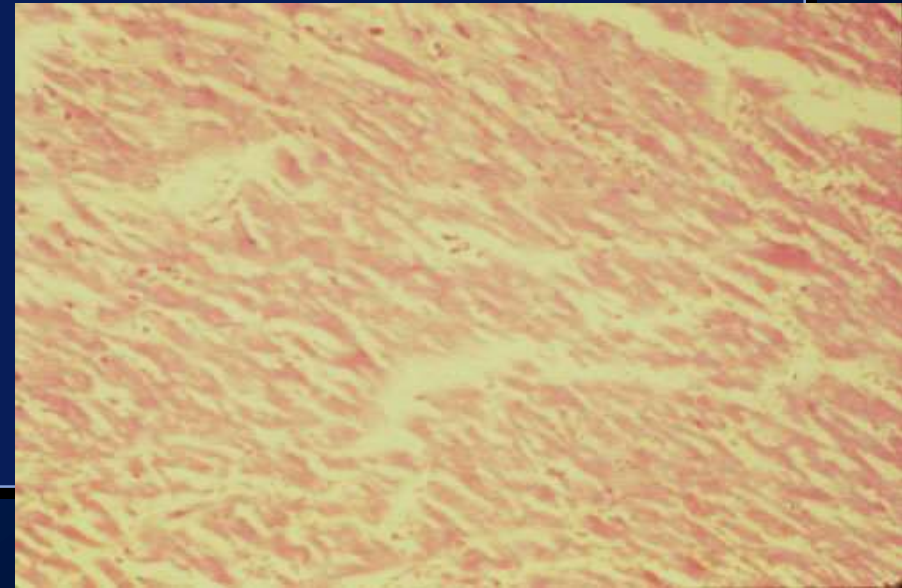
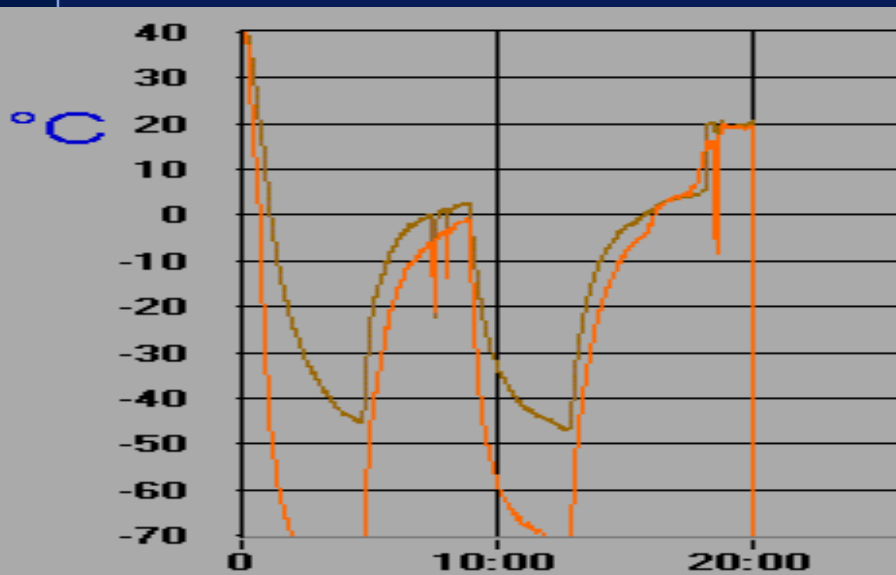
2. Target Accurately: Cryo

- Targeting
 - Multineedle configuration
 - Shape the ice to fit tumor
- Monitoring ablation development
 - Temperature, imaging, visual



3. Induce Reliable Cell Kill

- Renal Cryoablation Principles
- Temp < -40°C kills; < -20°C kills if used twice
- Multiple “freeze/thaw” cycles

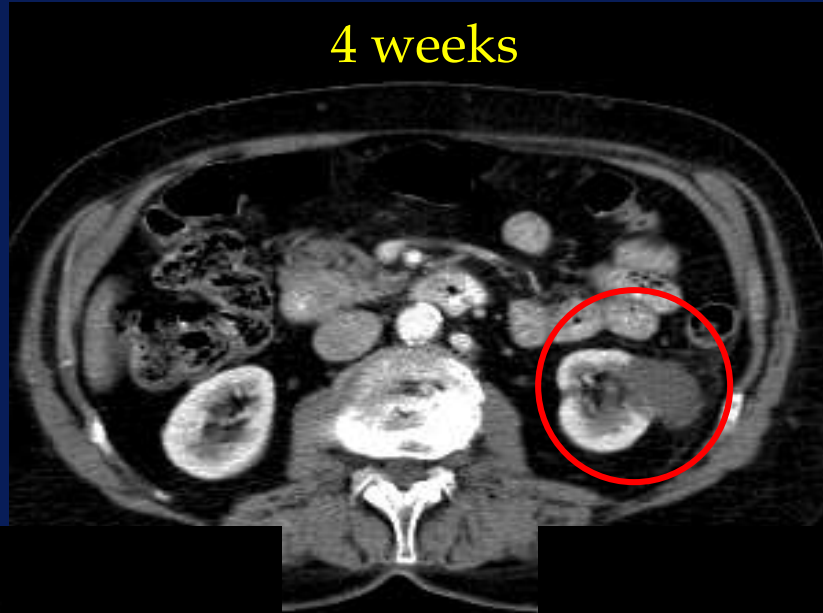


Effective Needle Ablation: Requirements

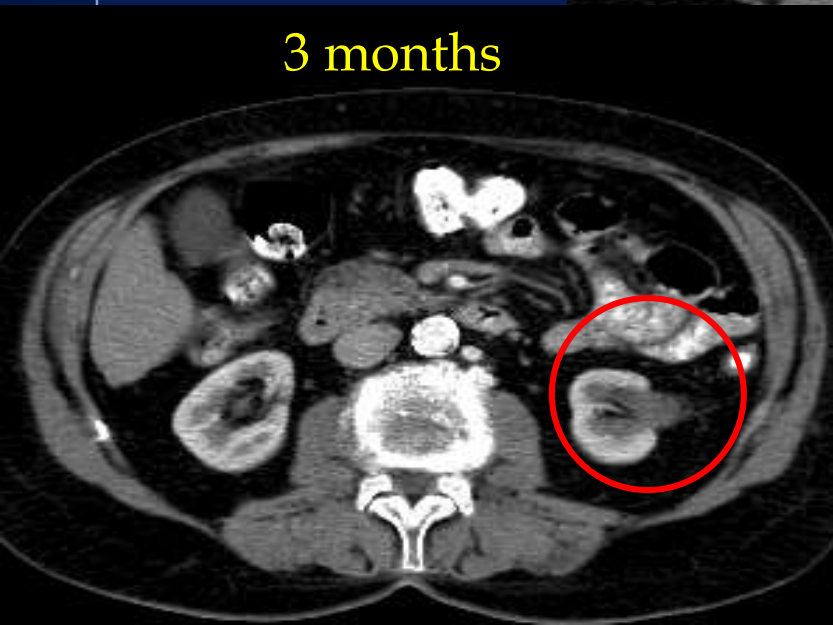
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Decreasing size of the lesion

4 weeks



3 months



9 months



No contrast-enhancement

Before treatment



3 months after treatment



Bristol Lap Cryo Outcomes

Number of tumours treated	110
Tumour size (mm)	28.8 (9-53)
Age (years)	65 (35-89)
Operation time (min)	163 (100-274)
Postoperative complications	
I	10
II	6
IIIA	5
IIIB	2
Follow-up:	4.3 years
Local Failure/persistence:	4
Late recurrence:	2
Metastases:	0

Cryoablation vs. Partial

- Retrospective analysis of 1803 cT1 pts. at Mayo Clinic
- cT1a: Onc. outcomes for partial & cryo superior to RF
- cT1b: Partial group younger, healthier, & better OS than cryo; oncological outcomes similar
- Syst. reviews: cryo safer but higher local recurrence
- Different baseline characteristics; interpret with caution
- Systematic bias: large numbers of apples v oranges
- RCT: Feasibility study (CONSERVE) comparing needle ablation to extirpative surgery
- SURAB comparing ablation to surveillance
- Difficult to prove a difference

Functional Outcomes

- Washington University in St. Louis
- 267 cryo vs. 233 robotic partial
- eGFR 6% lower vs. 13% lower
- Loss of parenchyma and/or ischemia
- Low eGFR strong predictive factor for OS

Tanagho et al J Endourol 2013

Kim et al Urology 2014

Patient Selection (Revisited)

- Cases to avoid:
- Truly unfit
- High nephrometry score
- Central
- Large



Summary

- Smaller tumor incidence rising
- More treatment options are available
- Treatment with less morbidity becomes more attractive
- Extirpative surgery remains standard of care
- Techniques evolving quickly