



**IEO EDUCATION**  
European Institute of Oncology



**Friends of Robotics**

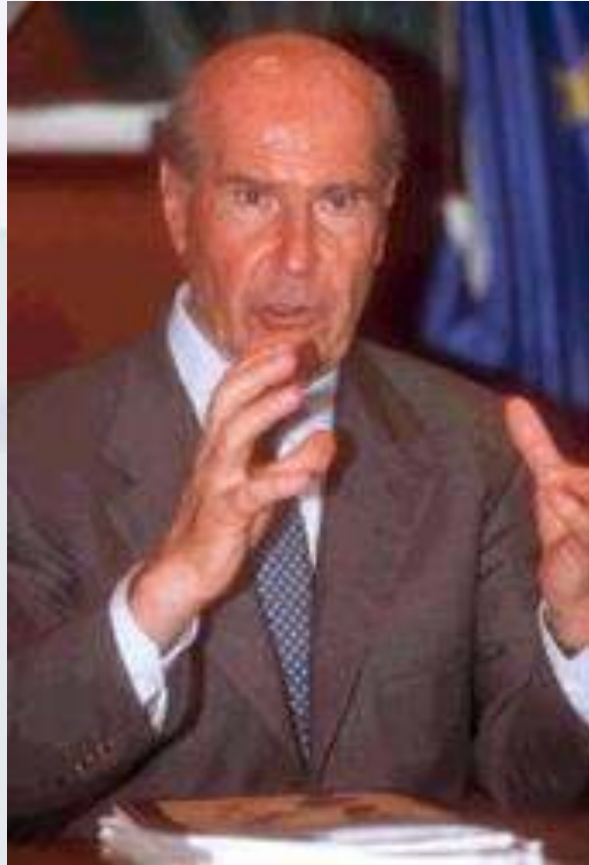
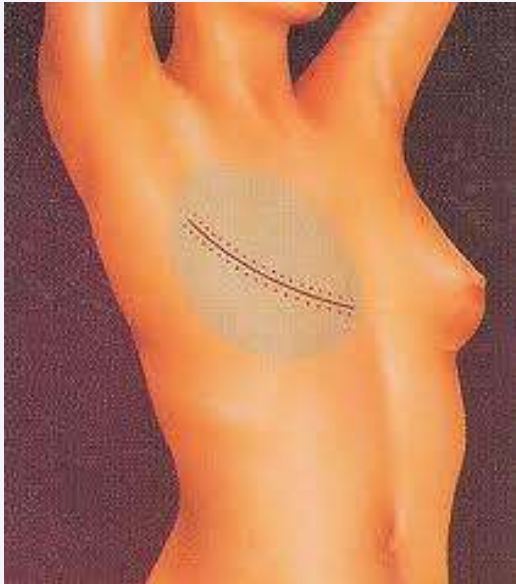
# **Novel trends in robot assisted Nephron Sparing Surgery**

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Deliu-Victor Matei  
European Institute of Oncology

# Breast Cancer: The Quadrantectomy

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# The modern Oncologic Surgery



**“maximum tolerable  
treatment”**

**Maintaining  
the same  
oncologic  
results**

# Breast Cancer: The Quadrantectomy

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**MASTECTOMY**

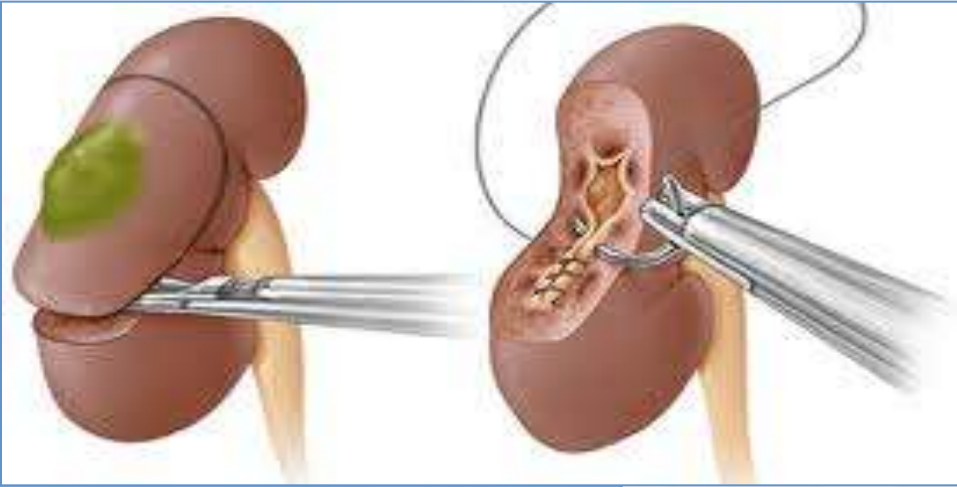


**QUADRANTECTOMY**

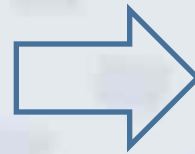
**Improved cosmetics &  
psycho-sexual outcomes**

# Kidney Cancer: Nephron Sparing Surgery

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**RADICAL  
NEPHRECTOMY**



**PARTIAL  
NEPHRECTOMY**

**Improved renal function  
maintenance**



# Minimally effective treatment evolution

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**PARTIAL  
NEPHRECTOMY**



**SIMPLE  
TUMORECTOMY**

**OFF CLAMPING  
(NO ISCHEMIA)**



**REDUCED (>40')  
WI TIME**

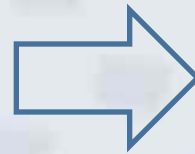
**Improved  
renal  
function  
maintenance**

# Kidney Cancer: Minimally Invasive Surgery

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**Maintaining  
the same  
oncologic  
results**

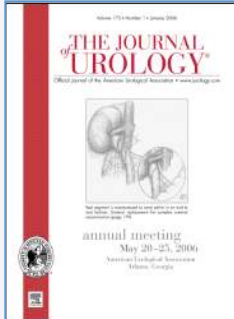
**OPEN  
SURGERY**



**PURE LAP  
SURGERY**

**Improved BL, Pain-Control,  
Recovery outcomes**

# Kidney Cancer: Minimally Invasive Surgery



## SURGICAL TREATMENT OF RENAL NEOPLASIA: EVOLVING TOWARD A LAPAROSCOPIC STANDARD OF CARE

SAM B. BHAYANI, RALPH V. CLAYMAN, CHANDRU P. SUNDARAM, JAIME LANDMAN, GERALD ANDRIOLE, R. SHERBURNE FIGENSHAU, ARNOLD BULLOCK, STEVEN BRANDES, ARIEH SHALHAV, ELSPETH McDOUGALL, AND ADAM S. KIBEL

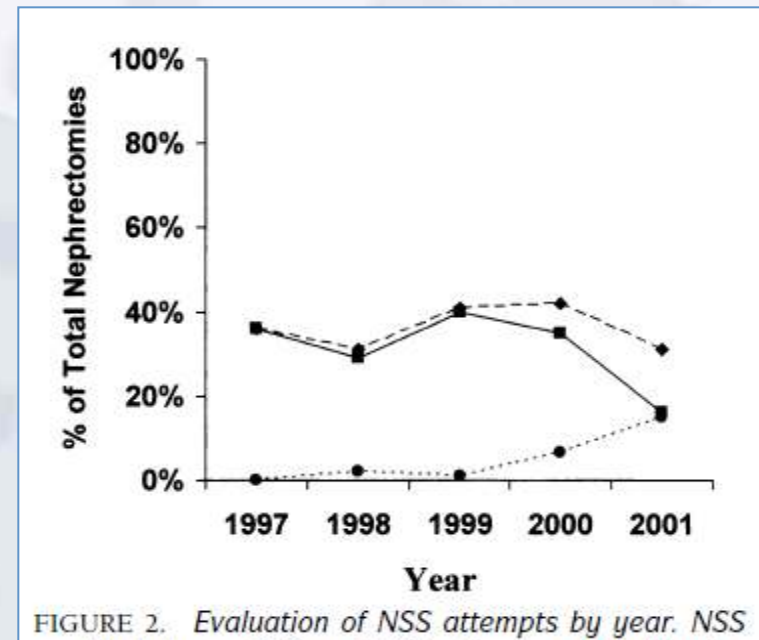
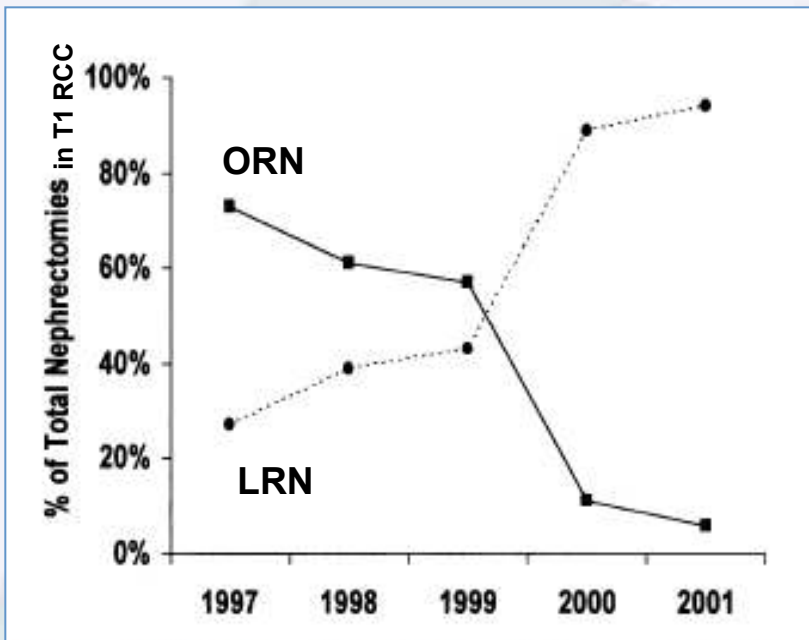


FIGURE 2. Evaluation of NSS attempts by year. NSS



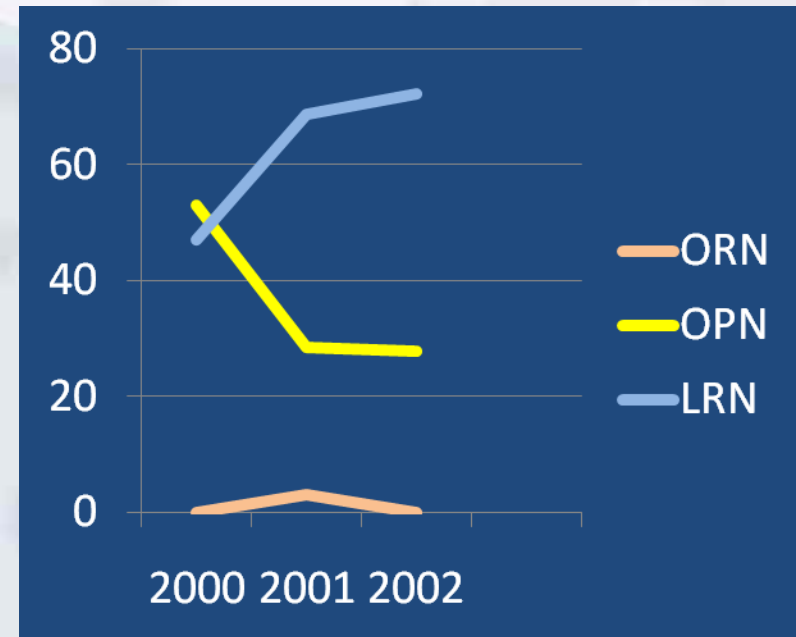
# Kidney Cancer: Minimally Invasive Surgery



## PRACTICE PATTERNS AMONG UROLOGIC SURGEONS TREATING LOCALIZED RENAL CELL CARCINOMA IN THE LAPAROSCOPIC AGE: TECHNOLOGY VERSUS ONCOLOGY

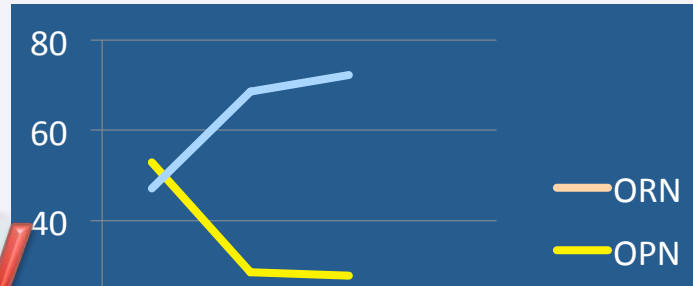
DOUGLAS S. SCHERR, CASEY NG, RAVI MUNVER, R. ERNEST SOSA,  
E. DARRACOTT VAUGHAN, JR, AND JOSEPH DEL PIZZO

that even in the later years of our analysis, the percentage of small tumors (less than 4 cm) managed with LRN has increased with time.



# Kidney Cancer

## Technology



## Oncology

**Minimally  
invasive  
surgery**



**Minimally  
effective  
surgery**

# Kidney Cancer: Robot assisted NSS

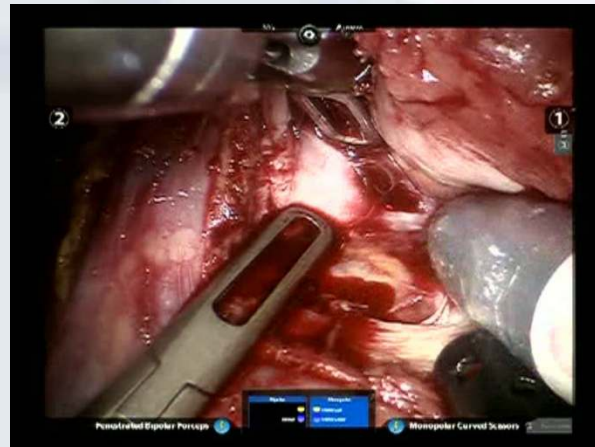
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**Technology**



**Oncology**

**Minimally  
invasive  
surgery**



**Minimally  
effective  
surgery**

# Minimally effective treatment evolution

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**PARTIAL  
NEPHRECTOMY**



**SIMPLE  
TUMORECTOMY**

**Improved  
renal  
function  
maintenance**



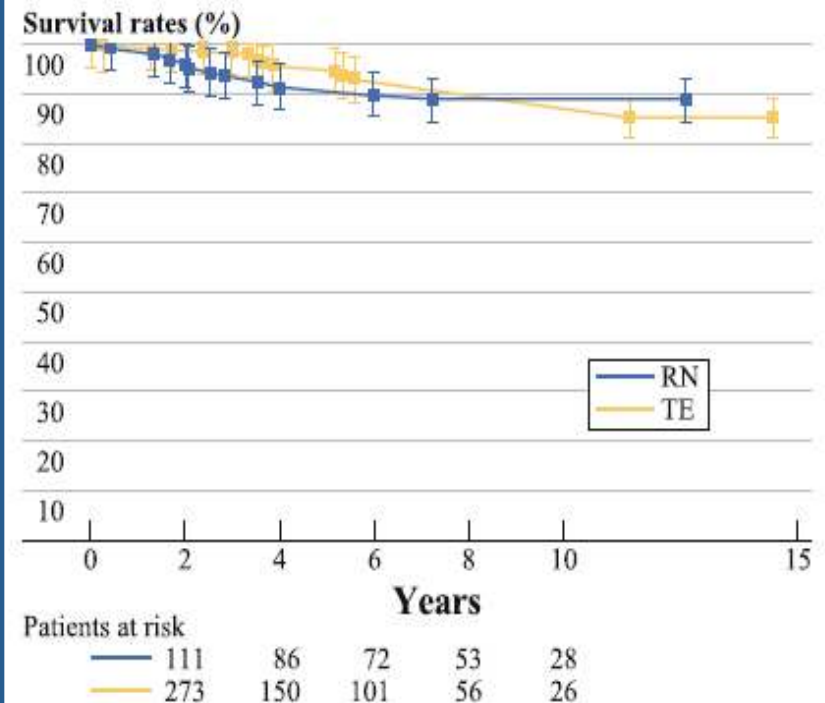
# Simple Enucleation Versus Radical Nephrectomy in the Treatment of pT1a and pT1b Renal Cell Carcinoma

Ann Surg Oncol (2012) 19:694–700

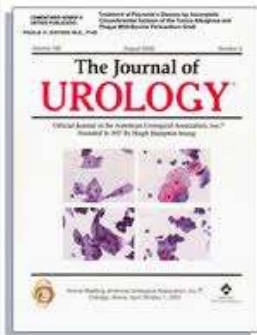
Andrea Minervini, MD, PhD, Sergio Serni, MD, Agostino Tuccio, MD, Giampaolo Siena, MD, Gianni Vittori, MD, Lorenzo Masieri, MD, PhD, Saverio Giancane, MD, Michele Lanciotti, MD, Saba Khorrami, MD, Alberto Lapini, MD, and Marco Carini, MD

The surgical margin status of tumors that had TE was always negative.

Variable	RN (n = 143)	TE (n = 332)	P
Age (years)	61.9 ± 13.1	62.7 ± 13.2	0.56
Gender			0.13
Male	83 (58)	217 (65.4)	
Female	60 (42)	115 (34.6)	
Clinical tumor size, cm	4.9 ± 1.4	3.2 ± 1.1	<0.0001
Pathologic tumor size, cm	4.8 ± 1.4	3.2 ± 1.1	<0.0001
Pathologic tumor stage (TNM, 2002)			<0.0001
T1a	51 (35.7)	275 (82.8)	
T1b	92 (64.3)	57 (17.2)	





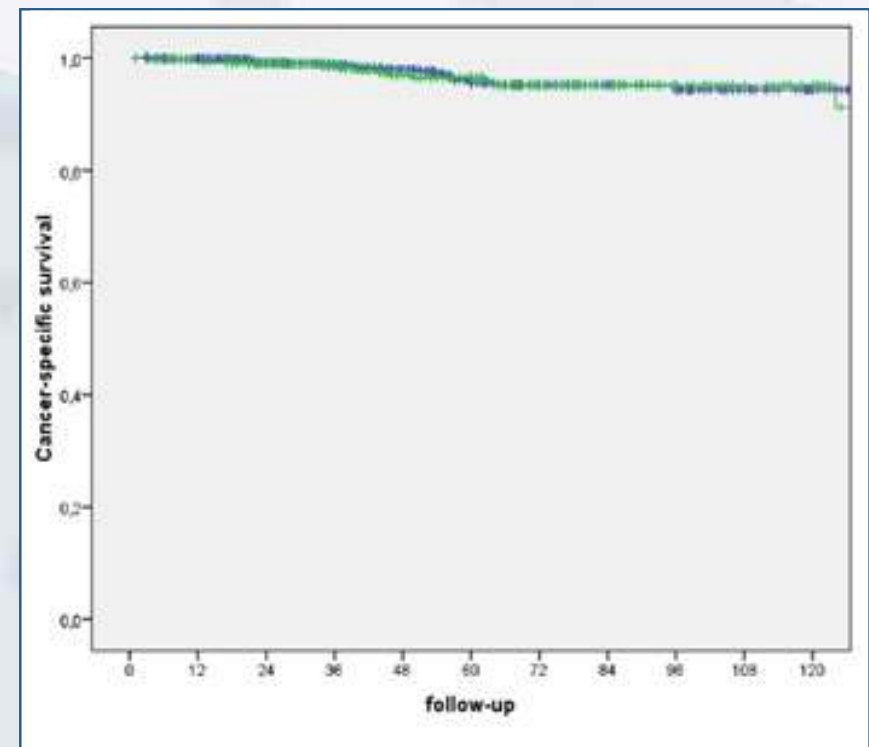


## Simple Enucleation is Equivalent to Traditional Partial Nephrectomy for Renal Cell Carcinoma: Results of a Nonrandomized, Retrospective, Comparative Study J Urol, 185, 2011

Andrea Minervini,\* Vincenzo Ficarra, Francesco Rocco, Alessandro Antonelli, Roberto Bertini, Giorgio Carmignani, Sergio Cosciani Cunico, Dario Fontana, Nicola Longo, Giuseppe Martorana, Vincenzo Mirone, Giuseppe Morgia, Giacomo Novara, Marco Roscigno, Riccardo Schiavina, Sergio Serni, Claudio Simeone, Alchiede Simonato, Salvatore Siracusano, Alessandro Volpe, Filiberto Zattoni, Alessandro Zucchi, Marco Carini and Members of the SATURN Project-LUNA Foundation

	Traditional PN	SE	<i>p</i> Value
Total	982	537	
Diam.	3.5 ± 1.7	3.2 ± 1.4	0.004
PSM	25 (3.4)	1 (0.2)	<0.001

**T3b**



# Morbidity of tumour enucleation for renal cell carcinoma (RCC): results of a single-centre prospective study

Andrea Minervini, Gianni Vittori, Alberto Lapini, Agostino Tuccio, Giampaolo Siena, Sergio Serni and Marco Carini

*Department of Urology, University of Florence, Careggi Hospital, Florence, Italy*

Variable	Value	NCI-CTC v2.0 severity grade, <i>n</i>
Total number of patients	200	
Patients with postoperative AEs, <i>n</i> (%)	30 (15)	
Mean (SD; median; range) LOS, days	6.2 (2.1; 6; 4-24)	
Total number of postoperative AEs	32	Grade I, 6 Grade II, 20 Grade III, 6
Medical AEs, <i>n</i> (%)	5 (2.5)	
Surgical AEs, <i>n</i> (%)	27 (13.5)	

Nicholas A Laryngakis<sup>1</sup>,  
Keith N Van Arsdalen<sup>1</sup>,  
Thomas J Guzzo<sup>1</sup> and  
S Bruce Malkowicz<sup>1,2</sup>

# Tumor enucleation: a safe treatment alternative for renal cell carcinoma

*Expert Rev. Anticancer Ther.* 11(6), 893–899 (2011)

- Enucleation

- preserves more normal parenchyma
- often avoids renal vessel clamping and WI
- often can be performed for tumors near the hilum or collecting system

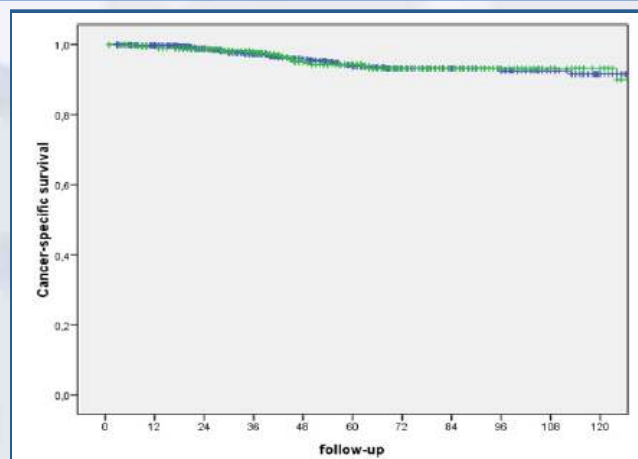
Variable	Value
Clamping of renal pedicle, n (%)	
Pedicle <i>en bloc</i>	169 (84.5)
Artery	16 (8)
Manual compression	3 (1.5)
No clamping	12 (6)

Nicholas A Laryngakis<sup>1</sup>,  
Keith N Van Arsdalen<sup>1</sup>,  
Thomas J Guzzo<sup>1</sup> and  
S Bruce Malkowicz<sup>1,2</sup>

# Tumor enucleation: a safe treatment alternative for renal cell carcinoma

*Expert Rev. Anticancer Ther.* 11(6), 893–899 (2011)

- Comparable long-term PFS & CSS has been shown between TE and standard PN





Nicholas A Laryngakis<sup>1</sup>,  
Keith N Van Arsdalen<sup>1</sup>,  
Thomas J Guzzo<sup>1</sup> and  
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# Tumor enucleation: a safe treatment alternative for renal cell carcinoma

*Expert Rev. Anticancer Ther.* 11(6), 893–899 (2011)

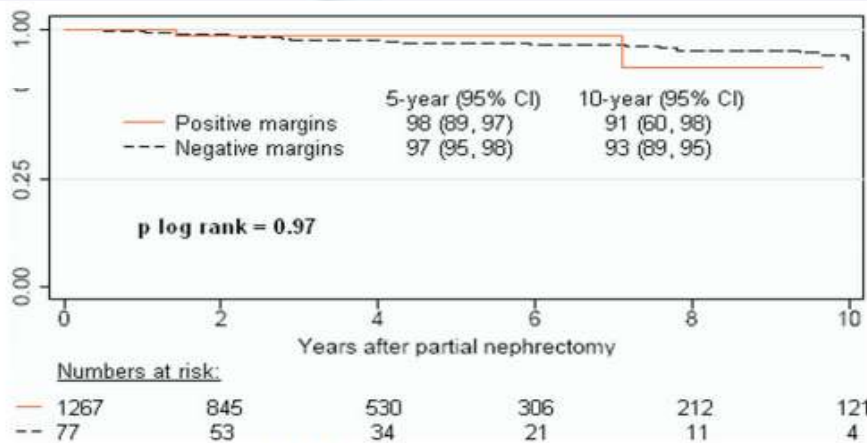


FIG. 1. Local recurrence-free survival

10 robotic 12 laparoscopic 7 open	Neph r.	Tumor bed resection	Total	Diam.
Radicalization	8	21	29	3.31
No residual ca	8	19	27	
Residual ca	0	2	2	4.5/6
II rad. (=neph.)	-	2		
Residual ca	-	2		

- There is controversy regarding the safety of renal tumor enucleation owing to histopathologic findings of pseudocapsule tumor invasion: renal tumor bed ablation using the argon beam and the neodymium:yttrium–aluminum–garnet laser may ablate any tumor cells extending beyond the pseudocapsule.

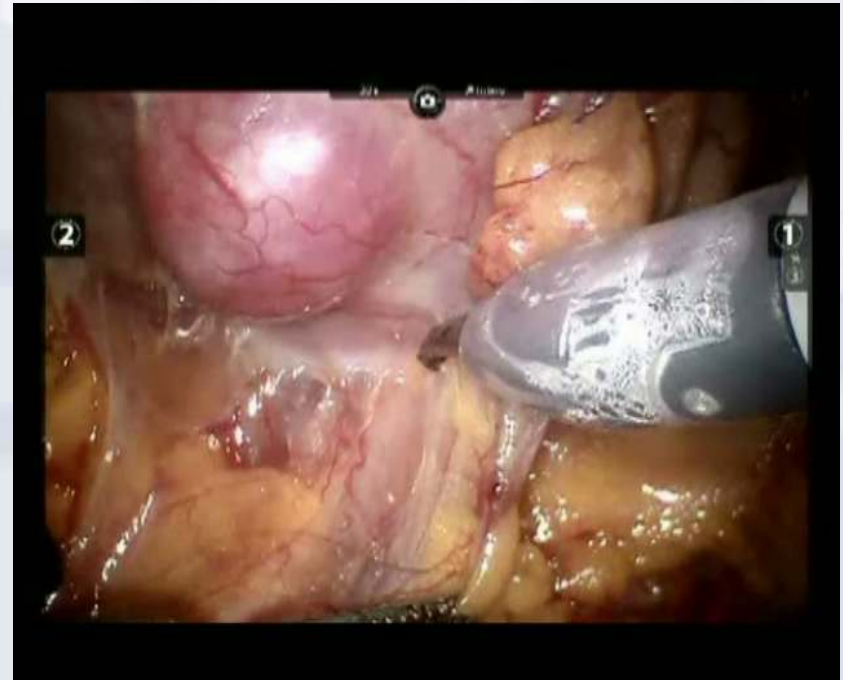


# Robot Assisted Renal Tumor Simple Enucleation

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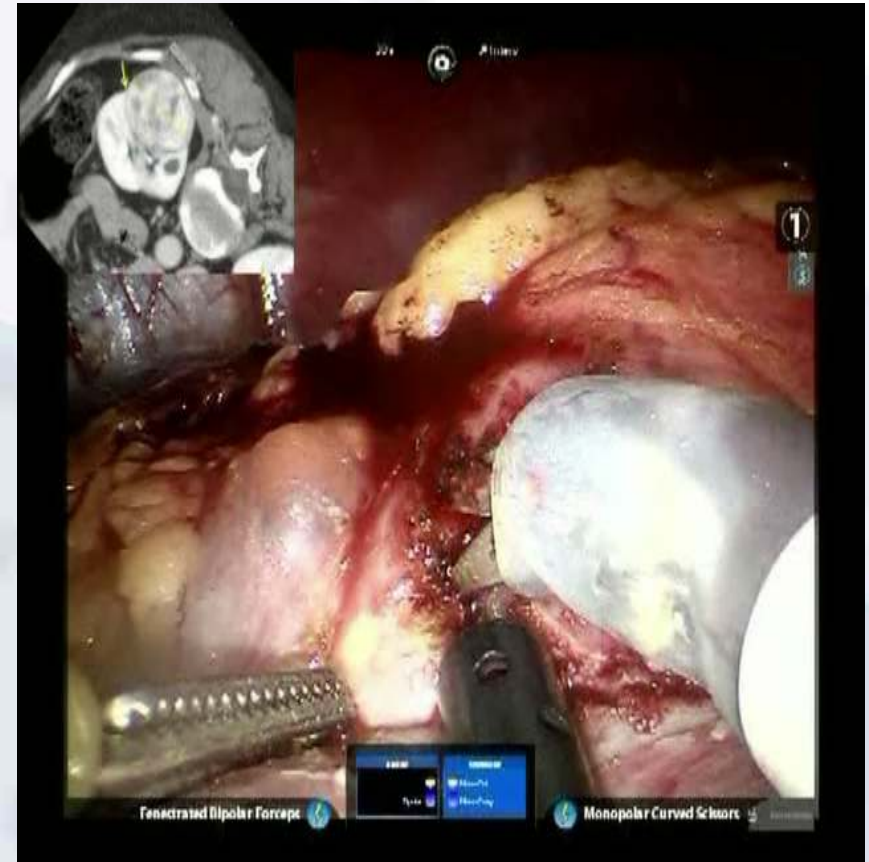


The circumferential approach to the tumor



# Robot Assisted Renal Tumor Simple Enucleation

The "beer-bottle-opener"  
approach to the tumor



# Robot Assisted Renal Tumor Simple Enucleation

	IEO series (17)		
	%	Ave	Range
Gender (M/F)	76.8%		13/4
Age		62.25	40-75
Side (R/L)	47%		8/9
CT Ø (mm)		30.9	
Pathology Ø (mm)		33.9	10-60
Padua Score		7.71	6-12
Vascular variant	25%		2.9
OR time		197	91-353
BL (mL)		460	10-1800
WI	35.3%	28.6'	13-42
Complications	23.5%		II, IIIa, IIIb IIIb

# Robot Assisted Renal Tumor Simple Enucleation

	IEO series (17)		Open (200)
	%	Ave	Ave
Gender (M/F)	76.8%		
Age		62.25	
Side (R/L)	47%		
CT Ø (mm)		30.9	
Pathology Ø (mm)		33.9	32
Padua Score		7.71	
Vascular variant	25%		
OR time		197	111.5
BL (mL)		460	174.2
WI	35.5%	28.6'	92.5%
Complications	23.5%		15%

# Minimally effective treatment evolution

---

**SIMPLE  
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(NO ISCHEMIA)**

**Improved  
renal  
function  
maintenance**

**REDUCED (>40')  
WI TIME**





## WUMS EXPERIENCE

### Surgical technique:

- **hylum preparation**

- tumor resection was performed using **the electrocautery at 50 watts** or the **Habib-4X bipolar resection device**\_\_ (Angio Dynamics, Queensbury, NY)

- the depth of the tumor was assessed, and the resection site was marked with the aid of **intraoperative ultrasonography & TilePro feature**

- vessels directly entering the tumor from the resection bed clipped with **Weck Hem-o-lok clips**

## Off-Clamp Robot-Assisted Partial Nephrectomy: Initial Washington University Experience

Youssef S. Tanagho, M.D., M.P.H.,<sup>1</sup> Sam B. Bhayani, M.D.,<sup>1</sup> Eric H. Kim,<sup>1</sup> Gurdarshan S. Sandhu, M.D.,<sup>1</sup>  
Nicholas P. Vaughn,<sup>2</sup> and R. Sherburne Figenshau, M.D.<sup>1</sup>

J Endourol, 2012

## Off-Clamp Robot-Assisted Partial Nephrectomy for Complex Renal Tumors

Eric H. Kim, M.D., Youssef S. Tanagho, M.D., M.P.H., Gurdarshan S. Sandhu, M.D.,  
Sam B. Bhayani, M.D., and R. Sherburne Figenshau, M.D.

J Endourol, 2012

## Robot-Assisted Partial Nephrectomy: Off-Clamp Technique

Gurdarshan S. Sandhu, MD, Eric H. Kim, BS, Youssef S. Tanagho, MD, MPH,  
Sam B. Bhayani, MD, and R. Sherburne Figenshau, MD

J Endourol, 2013

## WUMS EXPERIENCE

### Surgical technique:

- **hylum preparation**

- tumor resection was performed using **the electrocautery at 50 watts** or the **Habib-4X bipolar resection device** (Angio Dynamics, Queensbury, NY)

- the depth of the tumor was assessed, and the resection site was marked with the aid of **intraoperative ultrasonography & TilePro feature**

- vessels directly entering the tumor from the resection bed clipped with **Weck Hem-o-lok clips**

## IEO EXPERIENCE

### Surgical technique:

- **hylum preparation** (in all but 2)

- tumor resection is performed using **the sharp dissection** with cold scissors, **sparing or not** a minimal healthy tissue rim around the tumor

- vessels directly entering the tumor from the resection bed clipped with Weck **Hem-o-lok clips** or Ethicon **2mm Titanium clips**

# Robot Assisted Off-clamp NSS

	IEO series		
	19 (RASE = 11)		
	%	Ave	Range
Gender (M/F)	68.4%		13/6
Age		59.54	40-75
Side (R/L)	63.2%		12/7
CT Ø (mm)		25.1	
Pathology Ø (mm)		24.5	10-70
Padua Score		7.16	6-10
Vascular variant	23.5%		3.6
OR time		182	
BL (mL)		289	
Complications	21%		I, II, IIIa, IIIb

# Robot Assisted Off-clamp NSS

	IEO series		WUSM			
	19		42	15	50	39
	%	Ave	2012	2012	2012	2013
Gender (M/F)	68.4%		62	47	60	56.4
Age		59.54	59.9	59	60	59.4
Side (R/L)	63.2%		61	73	38	59.6
CT Ø (mm)		25.1				
Pathology Ø (mm)		24.5	27	25	26	28
Padua Score		7.2	6.1	8.7	5.9	6.2
Vascular variant	23.5%					
OR time		182	143	190	149	147
BL (mL)		289	210	403	195	150
Complications	21%		14.3%	7%	4%	5.1%



# Renal Functional and Perioperative Outcomes of Off-clamp Versus Clamped Robot-assisted Partial Nephrectomy: Matched Cohort Study

Youssef S. Tanagho, Sam B. Bhayani, Gurdarshan S. Sandhu, Nicholas P. Vaughn, Kenneth G. Nepple, and R. Sherburne Figenshau  
 J Urol, 2012

	No WI	WI	
Tumor characteristics (n = 29)			
Mean tumor size, cm (SD)	2.3 (1.2)	2.3 (1.4)	.983
Mean nephrometry score (SD)	5.7 (1.9)	5.7 (1.9)	—
Tumor laterality			
Surgical approach			
Transperitoneal (%)	18/29 (62.1)	29/29 (100.0)	<b>&lt;.001</b>
Retroperitoneal (%)	11/29 (37.9)	0/29 (0)	
Method of tumor resection			
No. using Habib resection device (%)	6/29 (20.7)	0/29 (0)	<b>.023</b>
No. using electrocautery (%)	23/29 (79.3)	29/29 (100)	
Renorrhaphy			
No. undergoing single-layer repair (%)	21/29 (72.4)	12/29 (41.4)	<b>.017</b>
No. undergoing 2-layer repair (%)	8/29 (27.6)	17/29 (58.6)	
Mean operative time, minutes (SD)	127.0 (37.9)	123.8 (33.7)	.721
Mean pre-op eGFR, mL/min/1.73 m <sup>2</sup> (SD)	84.8 (26.7)	85.8 (21.3)	.75
Mean eGFR at last follow-up (SD)	79.9 (25.0)	74.1 (21.1)	.194
Mean change in eGFR (SD)	-4.9 (8.9)	-11.7 (12.3)	<b>.033</b>
Mean creatinine follow-up, days (SD)	284.2 (343.5)	258.6 (255.3)	.791

The benefit is very small in renal functional terms and may have little clinical consequence. Further studies are needed to evaluate the clinical relevance of off-clamp PN



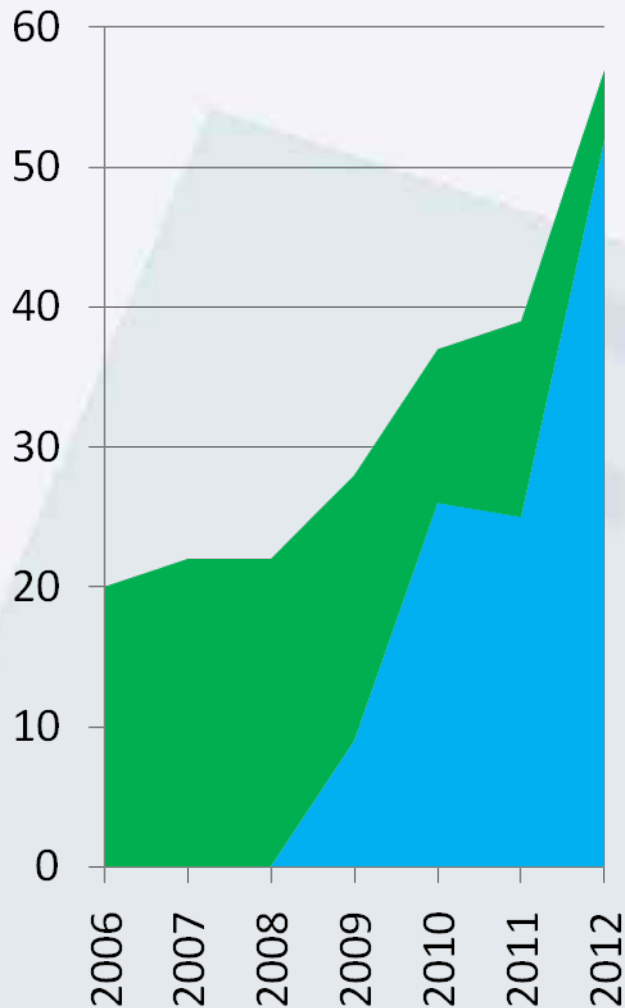
## **RASE without hilum dissection**

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# Robot Assisted Off-clamp NSS

IEO: 112 pts (07.2009 → 12.2012)



- **SIMPLE TUMOR ENUCLEATION IS**
  - **ONCOLOGICALLY SAFE**
  - **SPARES AT MAXIMUM THE REMNANT RENAL HEALTHY TISSUE**
  - **ALLOWS AN EXCELLENT QUALITY OFF-CLAMP ROBOT ASSISTED NEPHRON SPARING SURGERY**
- **HILUM PREPARATION MAY BE OMITTED IN HIGHLY SELECTED CASES**



**IEO EDUCATION**  
European Institute of Oncology



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Eastern Europe Urologists*

Milan, 14-15 March 2013

**Robotic Urologic Surgery  
Implementation Strategies**

**Friends of Robotics**

*This meeting has been made possible thanks  
to the generous support of*

**PORGES**

 **Coloplast** division

**MEDLINE**

**Applied  
Medical**



**Teleflex**



# Cost-Effectiveness Analysis of Nephron Sparing Options for the Management of Small Renal Masses

Steven L. Chang,<sup>\*,†</sup> Lauren E. Cipriano,<sup>‡</sup> Lauren C. Harshman, Alan M. Garber and Benjamin I. Chung  
J Urol, 2011

