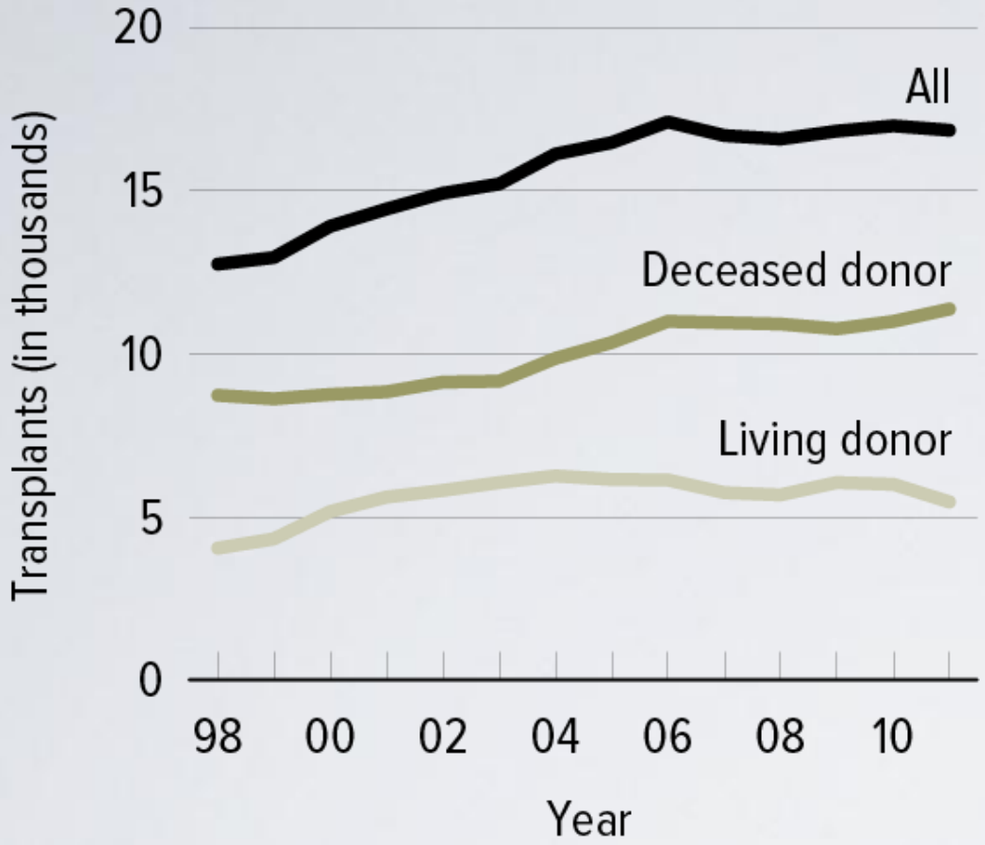
New Techniques in Kidney Transplantation

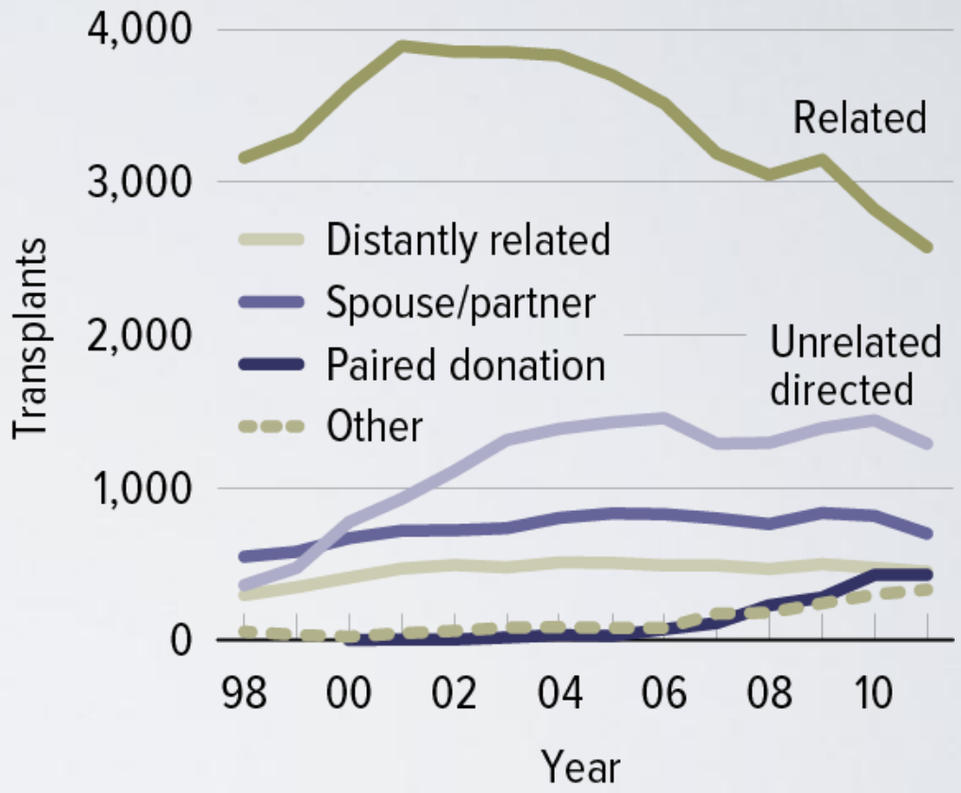
Amy R. Evenson, MD
Beth Israel Deaconess Medical Center
October 5, 2013
ASTS Fellows' Symposium

- Donor Techniques
- Recipient Techniques
- Exchange Programs

TOTAL ADULT KIDNEY TRANSPLANTS



LIVING DONORS BY DONOR RELATION



SRTR 2011 Annual Data Report

Chronology of Donor Procedures

Open Donor Nephrectomy

- Standard technique until mid-1990's
- Benefits: ? shorter WIT, ? Better immediate graft function
- Disadvantages:
  - 6-10 day hospitalization
  - Post-op pain, cosmesis of incision
  - 80 day out-of-work period

Photo of open nephrectomy incision

1995 Laparoscopic Donor Nephrectomy

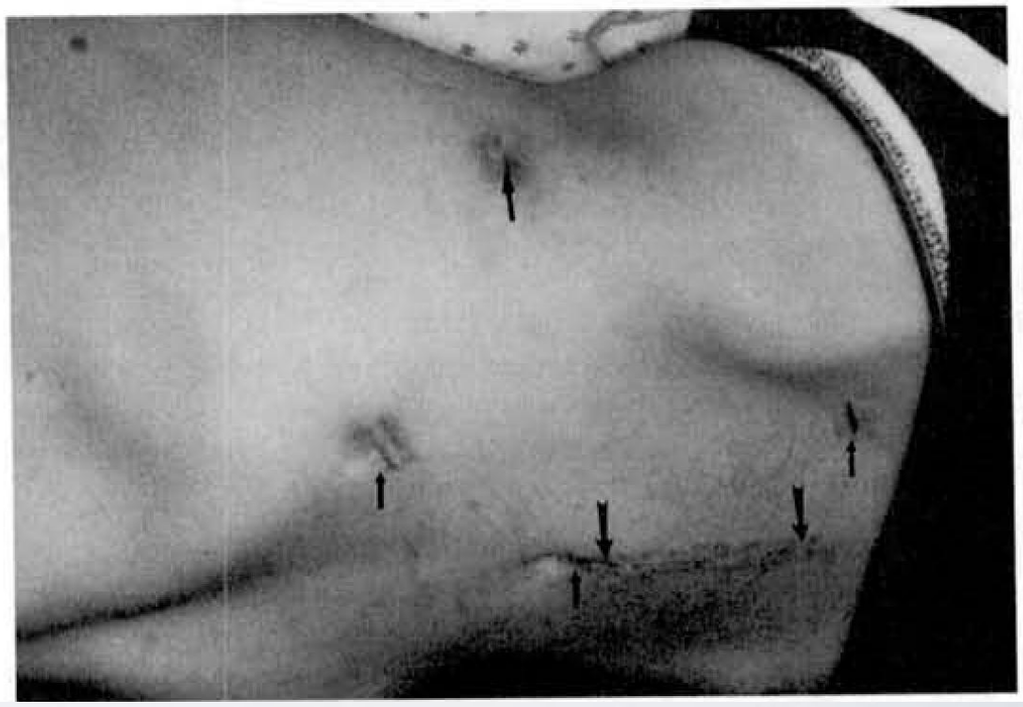
LAPAROSCOPIC LIVE DONOR NEPHRECTOMY

LLOYD E. RATNER,[1,2] LARS J. CISECK,[3] ROBERT G. MOORE,[3] FRANCISCO G. CIGARROA,[1] HOWARD S. KAUFMAN,[1] AND LOUIS R. KAVOUSSI[3]

Departments of Surgery and Urology, Johns Hopkins University School of Medicine and Johns Hopkins Bayview Medical Center, Baltimore, Maryland

A laparoscopic live-donor nephrectomy was performed on a 40-year-old man. The kidney was removed intact via a 9-cm infraumbilical midline incision. Warm ischemia was limited to less than 5 min. Immediately upon revascularization, the allograft produced urine. By the second postoperative day, the recipient's serum creatinine had decreased to 0.7 mg/dl. The donor's postoperative course was uneventful. He experienced minimal discomfort and was discharged home on the first postoperative day.

We conclude that laparoscopic donor nephrectomy is feasible. It can be performed without apparent deleterious effects to either the donor or the recipient. The limited discomfort and rapid convalescence enjoyed by our patient indicate that this technique may prove to be advantageous.



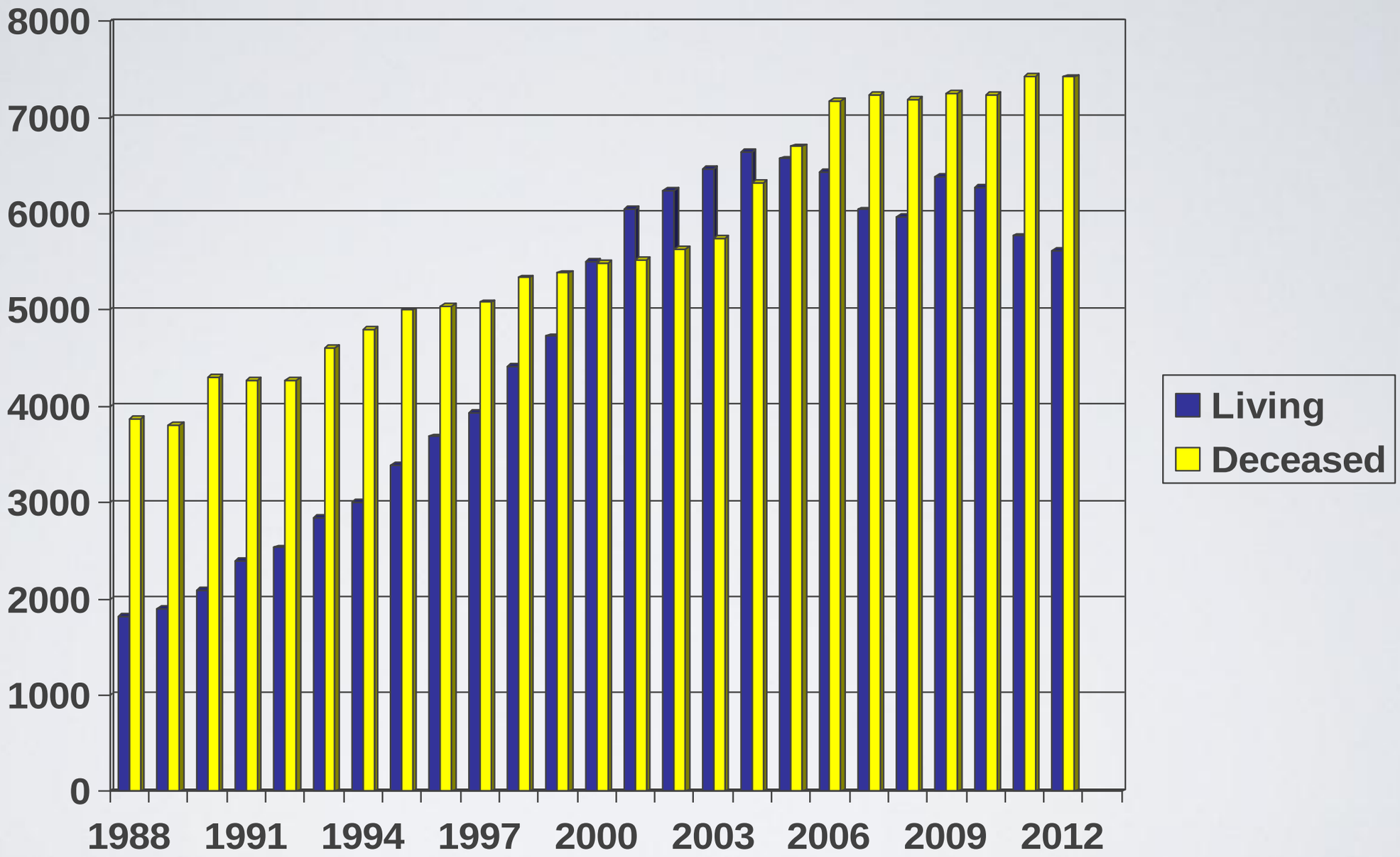
Transplantation 1995;60:1047-9

Contemporary Reaction

- From editor at Transplantation:

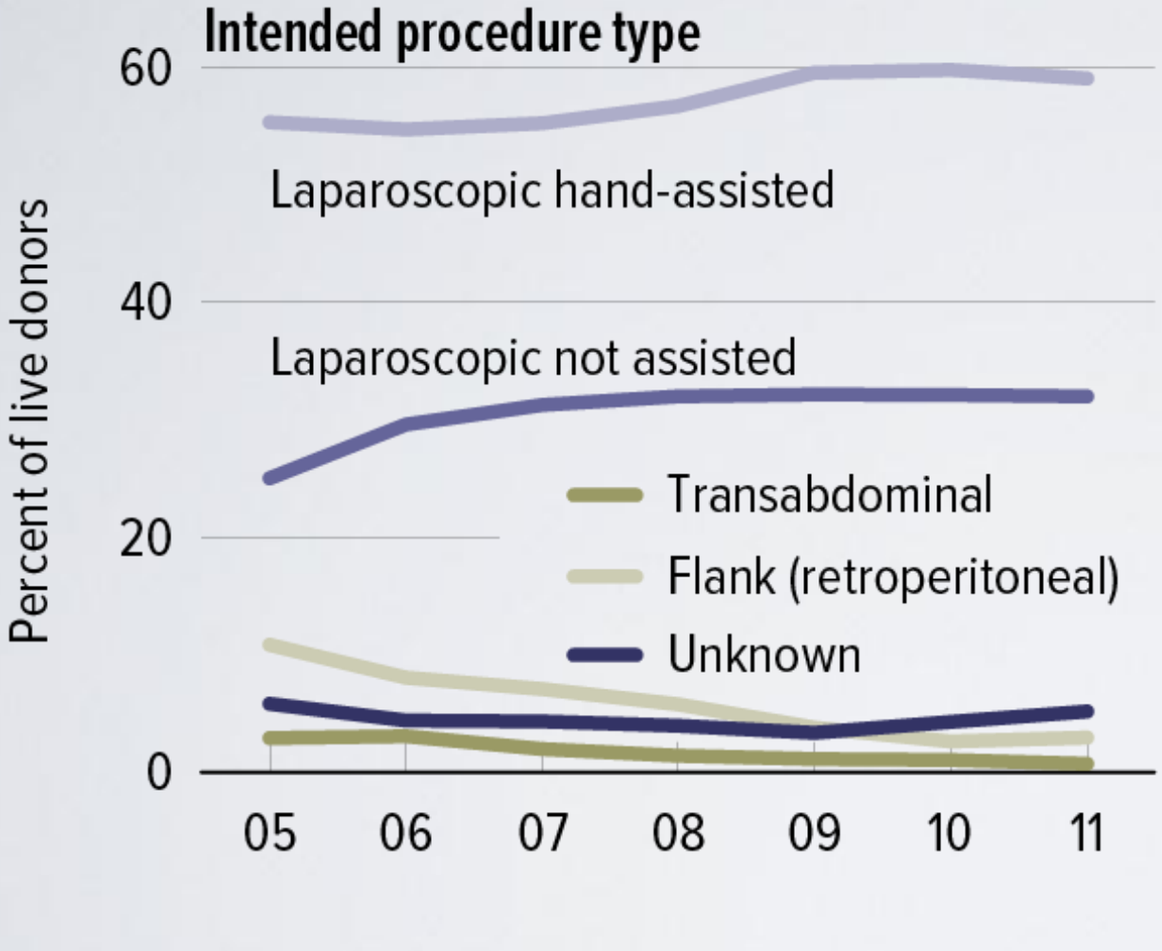
"This is a bad thing for transplantation. A safe donor operation has been around for 40 years. Why would anyone want to change it?"

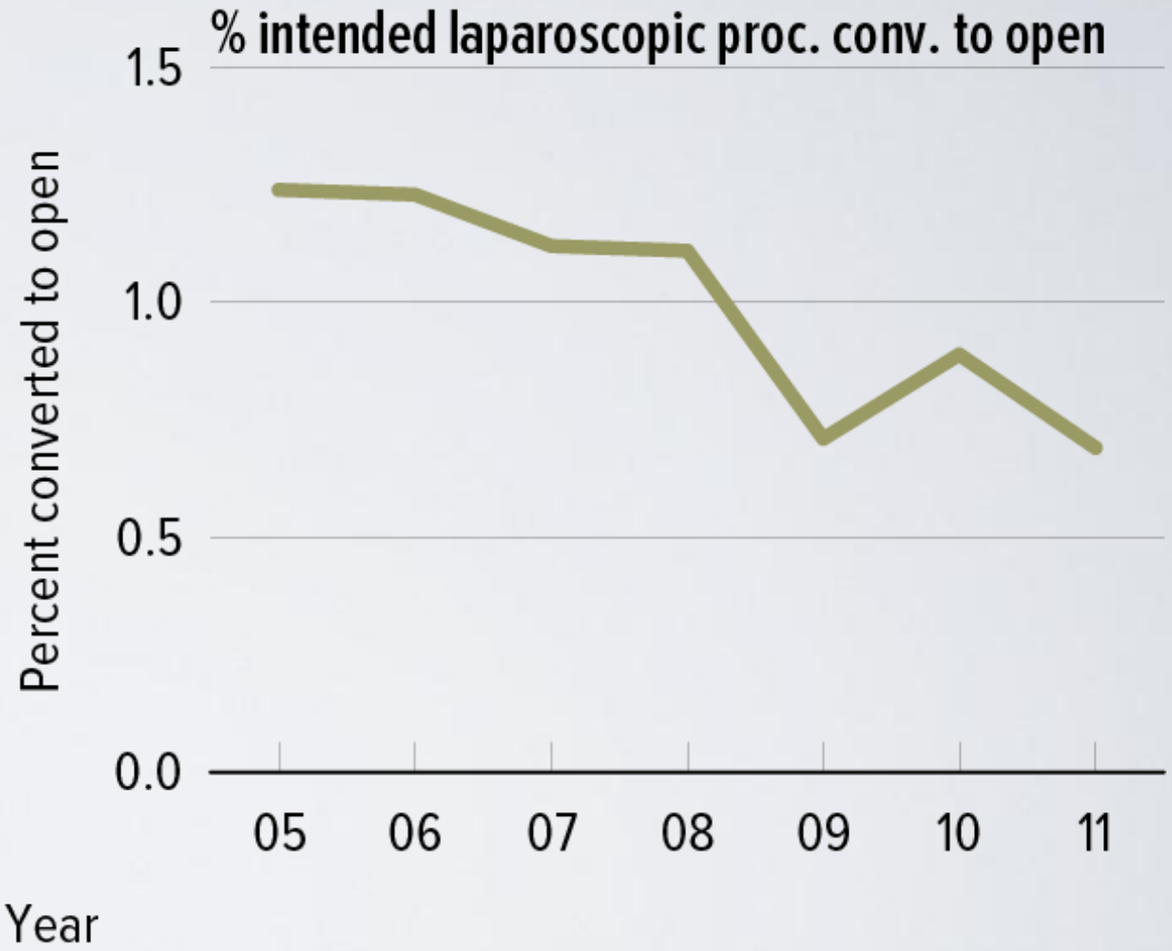
Trends in Kidney Donation



http://optn.transplant.hrsa.gov/latestData/rptData.asp

Current Standard of Care





Year

SRTR 2011 Annual Data Report

1998 Hand-Assisted Laparoscopy

HAND-ASSISTED LAPAROSCOPIC LIVE DONOR NEPHRECTOMY

J. STUART WOLF, JR, MARIE-BLANCHE TCHETGEN, AND ROBERT M. MERION

ABSTRACT

Minimally invasive live donor nephrectomy has been described using both standard laparoscopic dissection and "gasless" endoscopically assisted techniques. We report another method, hand-assisted laparoscopic live donor nephrectomy, which uses an occlusive sleeve to maintain pneumoperitoneum. The procedure is performed under excellent laparoscopic visualization in a generous operative field, and is facilitated substantially by manual assistance, which takes advantage throughout the procedure of the incision that is necessary for intact organ removal. The results of our first procedure are encouraging. UROLOGY **52:** 885–887, 1998.

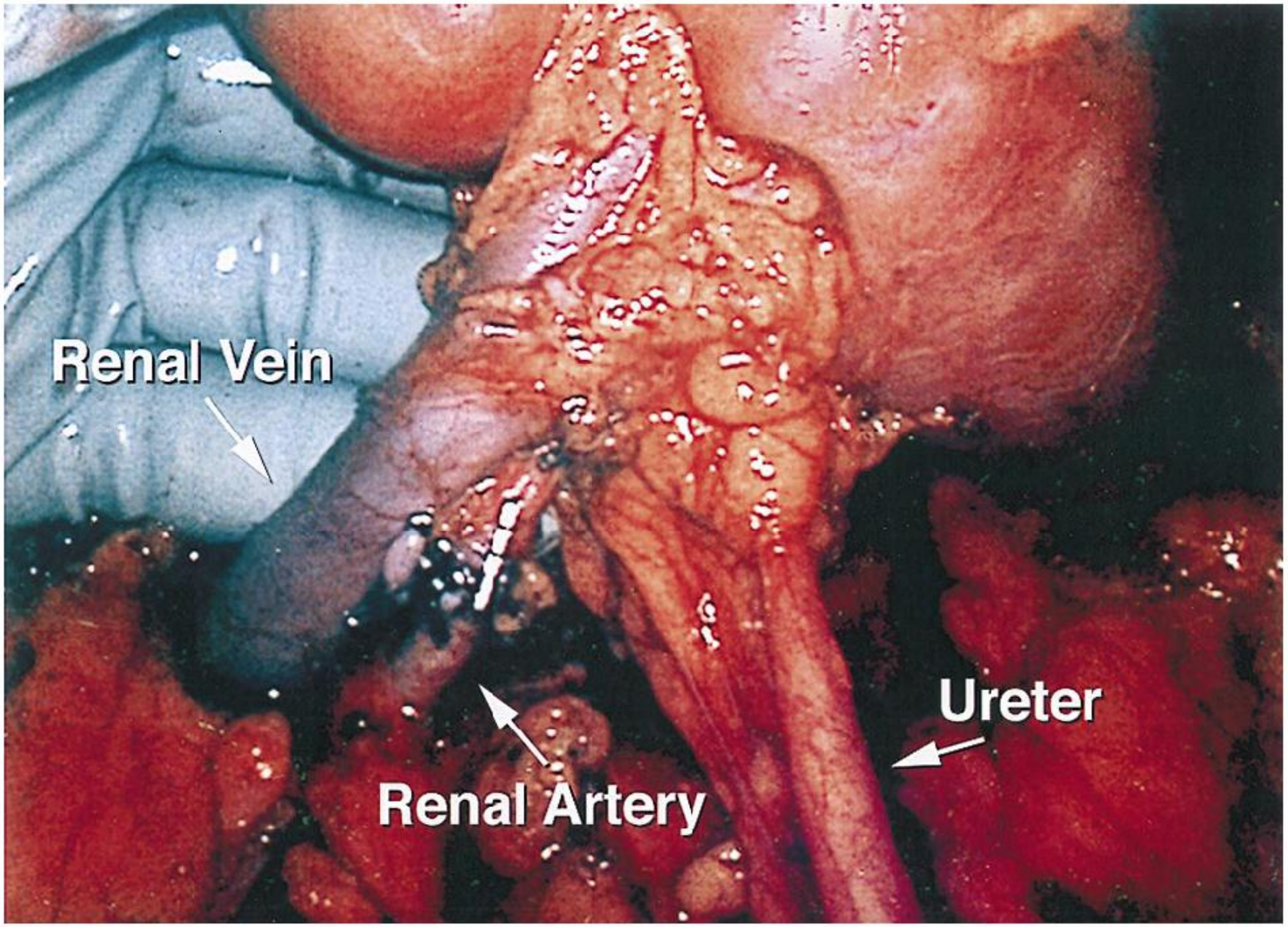


FIGURE 2. *Surgeon's left hand holding kidney just before incision of the ureter and renal hilum. Note the adequate length of the renal artery and vein, and the generous tissue maintained between the proximal ureter and kidney.*

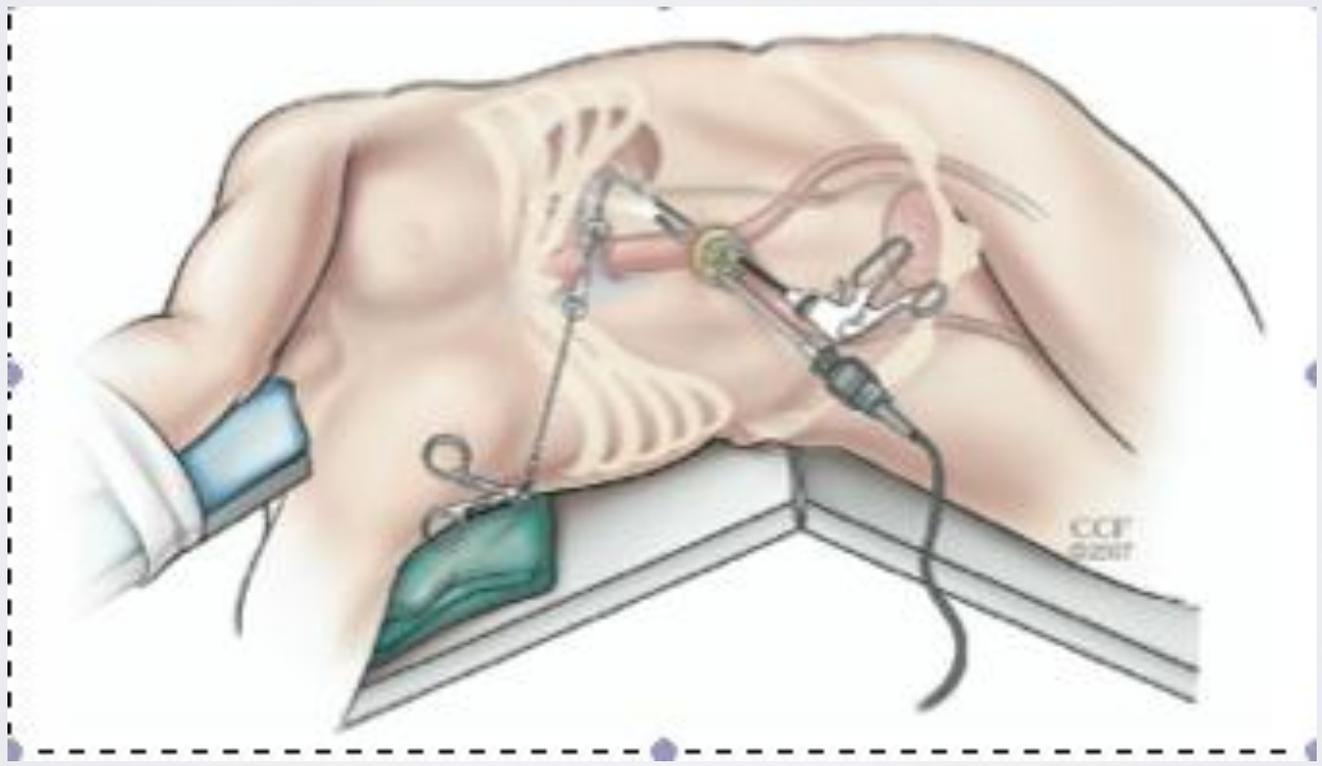
Urology 1998;52:885-7.

2008 SILS/Transumbilical

Single Port Transumbilical (E-NOTES) Donor Nephrectomy

Inderbir S. Gill,* David Canes, Monish Aron, Georges-Pascal Haber, David A. Goldfarb, Stuart Flechner, Mahesh R. Desai, Jihad H. Kaouk and Mihir M. Desai

From the Center for Laparoscopic and Robotic Surgery, Department of Urology, Glickman Urological and Kidney Institute, Cleveland Clinic, Cleveland, Ohio



J Urology 2008;180:637-41.

FIG. 5. Abdomen 2 weeks postoperatively

J Urology 2008;180:637-41.

2010 NOTES Extraction

American Journal of Transplantation 2010; 10: 1473–1477
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2010.03131.x

Case Report

Laparoscopic Live Donor Nephrectomy with Vaginal Extraction: Initial Report

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[a]*James Buchanan Brady Urological Institute, Department of Urology,* [b]*Department of Surgery, Division of Transplant Surgery,* [c]*Department of Obstetrics and Gynecology and* [d]*Department of Medicine, Division of Nephrology, Johns Hopkins Medical Institutions, Baltimore, MD*

The recent decrease in the total number of living kidney transplants coupled with the increase in the number of candidates on the waiting list underscores the importance of eliminating barriers to living kidney donation. We report what we believe to be the first pure right-sided laparoscopic live donor nephrectomy with extraction of the kidney through the vagina. The warm ischemia time was 3 min and the renal vessels and ureter of the procured kidney were of adequate length for routine transplantation. The donor did not receive any postoperative parenteral narcotic analgesia, was discharged home within 24 h and was back to normal activity in 14 days. The kidney functioned well with no complications or infections. Laparoscopic live donor nephrectomy with vaginal extraction may be a viable alternative to open and standard laparoscopic approaches. Potential advantages include reduced postoperative pain, shorter hospital stay and convalescence and a more desirable cosmetic result. These possible, but yet unproven, advantages may encourage more individuals to consider live donation.

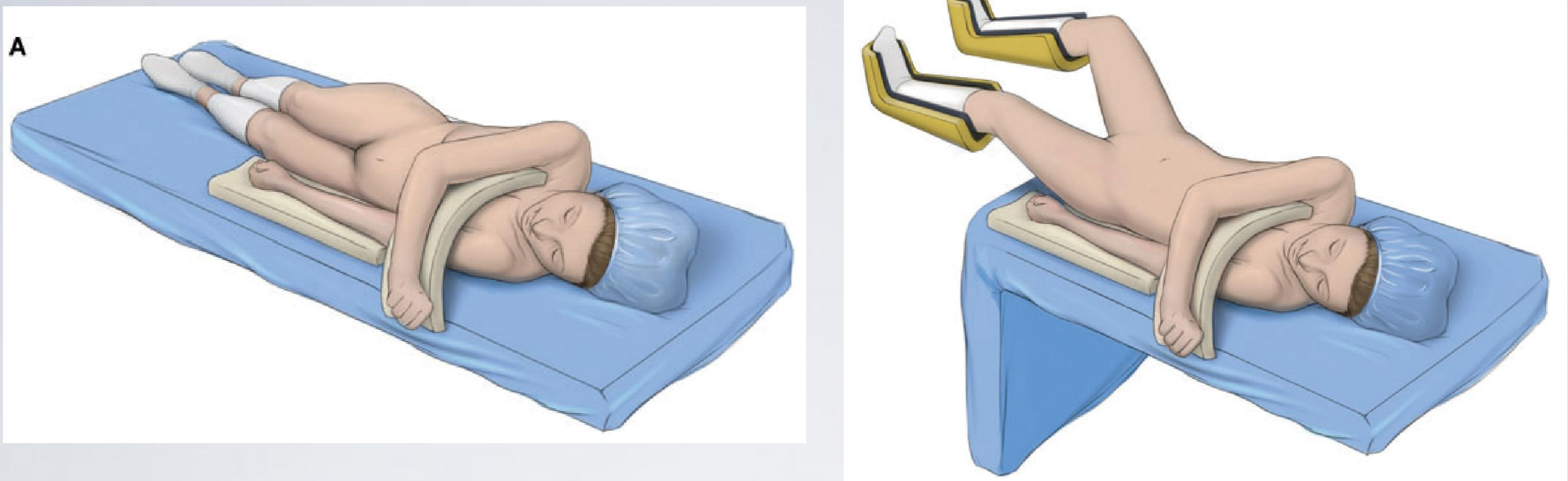


Figure 1: Patient positioning during right laparoscopic donor nephrectomy with vaginal extraction. (A) During the kidney dissection portion of the procedure, the patient was placed in the modified flank position with the left side down. (B) During the vaginal extraction portion of the procedure, the torso is maintained in the modified flank position while the patient's legs are placed in the lithotomy position to facilitate access to the vagina.

2002 Robotic-Assisted Laparoscopic

0041-1337/02/7309-1474/0
TRANSPLANTATION

Vol. 73, 1474–1479, No. 9, May 15, 2002
Printed in U.S.A.

ROBOTIC-ASSISTED LAPAROSCOPIC DONOR NEPHRECTOMY FOR KIDNEY TRANSPLANTATION

SANTIAGO HORGAN,[1] DANIEL VANUNO,[1] PIERPAOLO SILERI,[2] LUCA CICALESE,[2] AND ENRICO BENEDETTI[2,3]

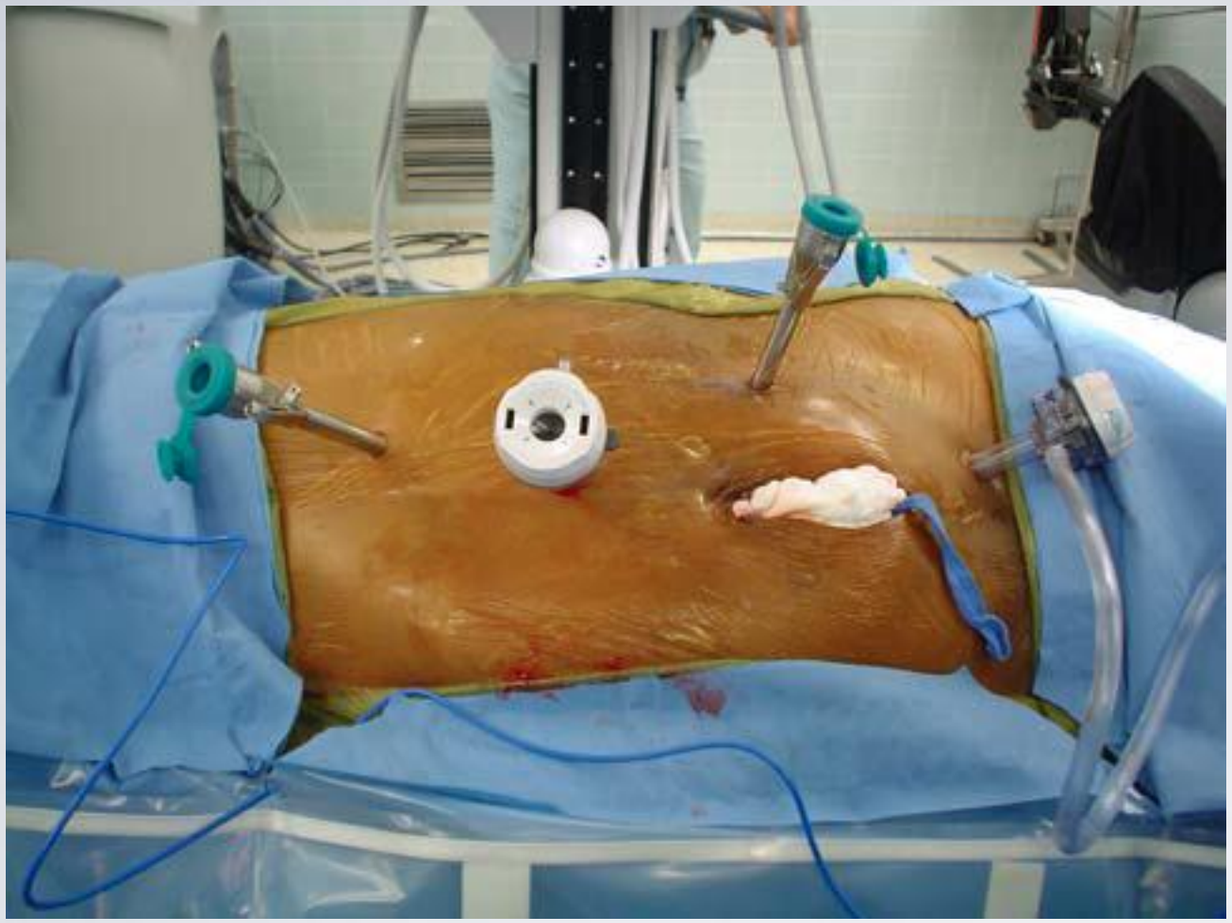
Minimally Invasive Surgery Center and Division of Transplantation, University of Illinois at Chicago Medical Center, Chicago, Illinois 60612

Background. **Minimally invasive laparoscopic nephrectomy is a well-established alternative to open surgery in living donors for kidney transplantation. Donor mortality and morbidity rates as well as recipient outcome are comparable to the open approach. Furthermore, the procedure is associated with reduced donor discomfort, faster recovery, and improved cosmetic results. Recently, an advanced robotic system for laparoscopic surgery was approved for use in the United States. This system allows a greater freedom of movement and recreates the hand–eye coordination and three-dimensional vision that is lost in standard laparoscopic procedures.**

Methods. **We report the first 12 successful cases of robotic-assisted laparoscopic living donor nephrectomy performed using the da Vinci Surgical System (Intuitive Surgical, Mountain View, CA).**

Results. **Our initial experience has shown that the system allows the performance of donor nephrectomy in a safe and accurate fashion.**

Conclusions. **As technology continues to evolve, robotic-assisted surgery has the potential to become a widely used attractive alternative to standard laparoscopic donor nephrectomy.**



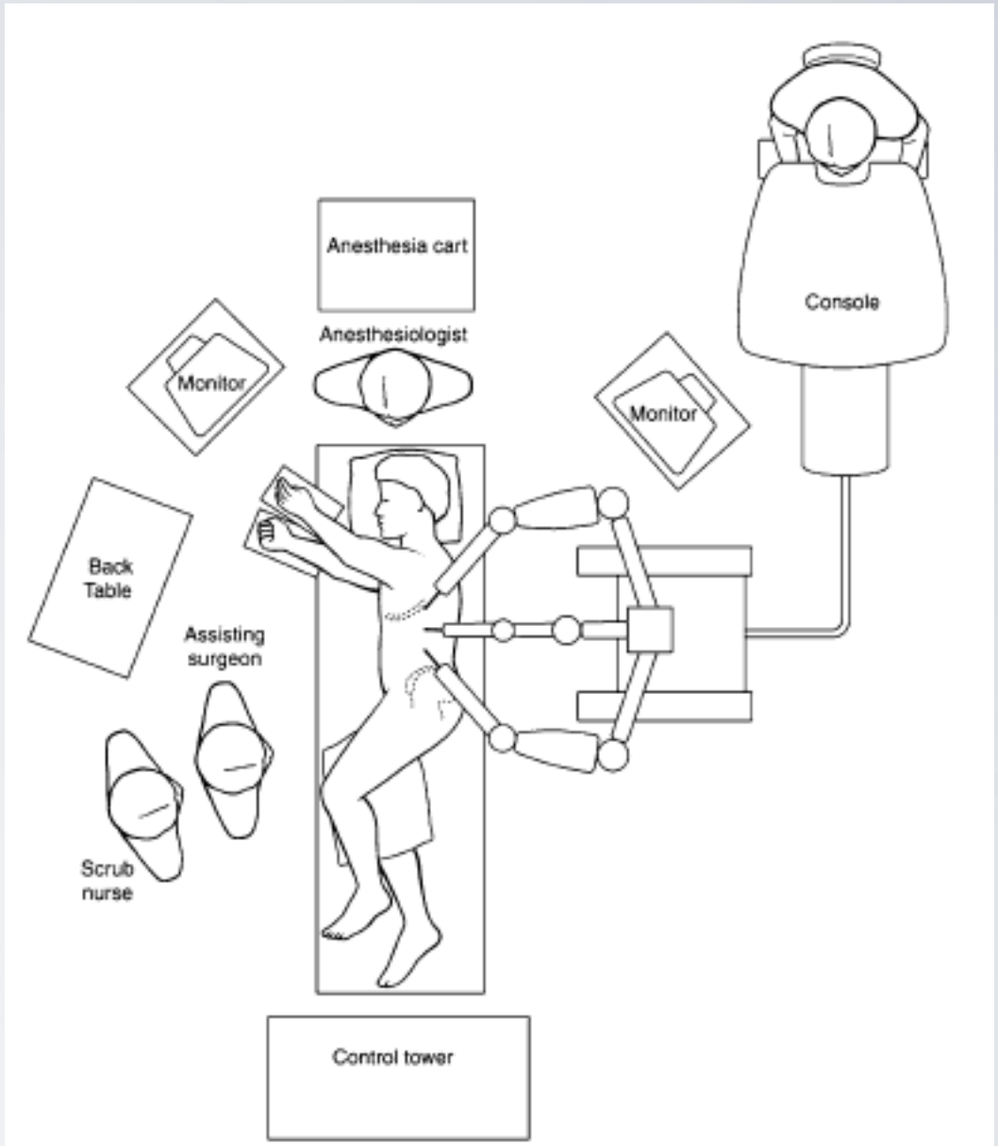


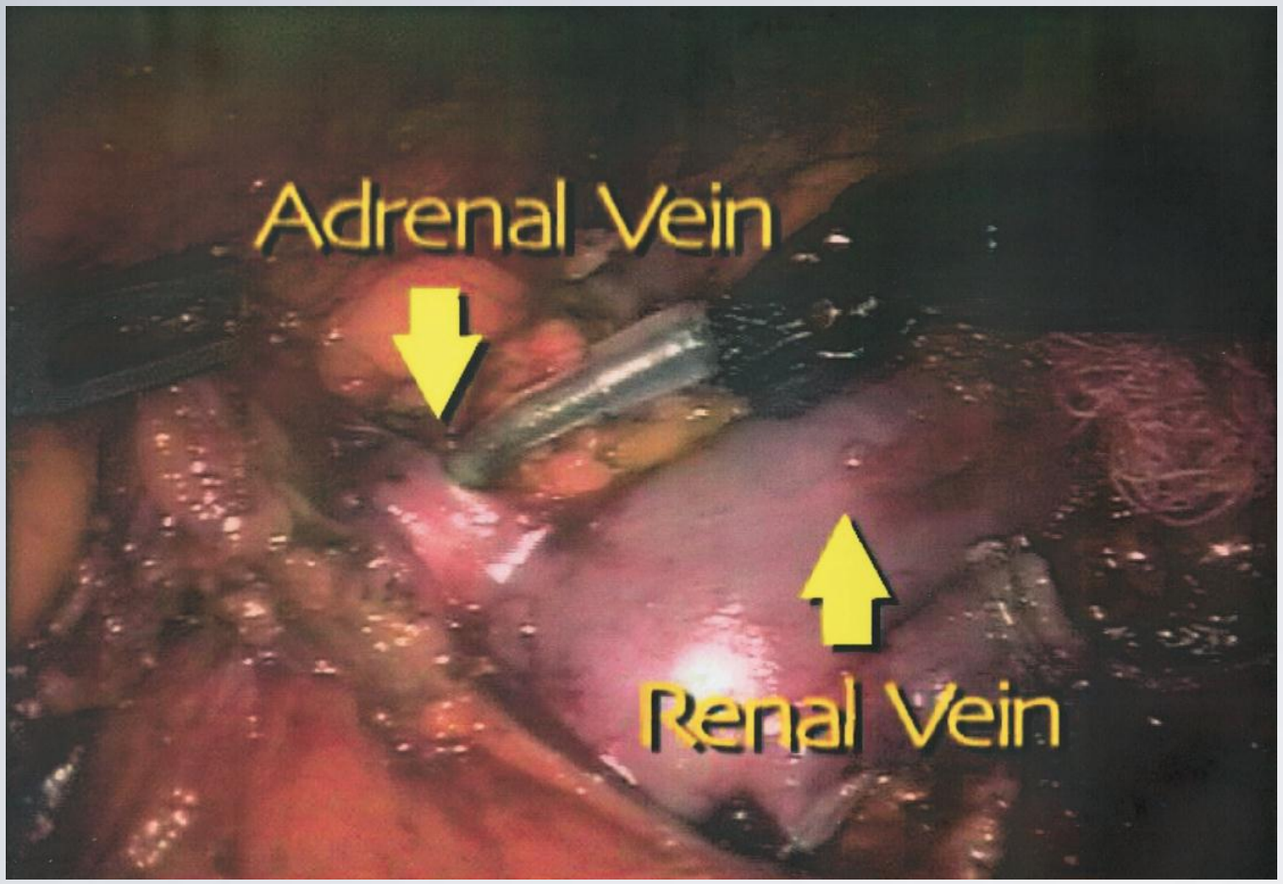
Fig. 2. Operating room setup for robotic hand-assisted donor nephrectomy (L-RHADN) with the patient placed in a right lateral decubitus position.

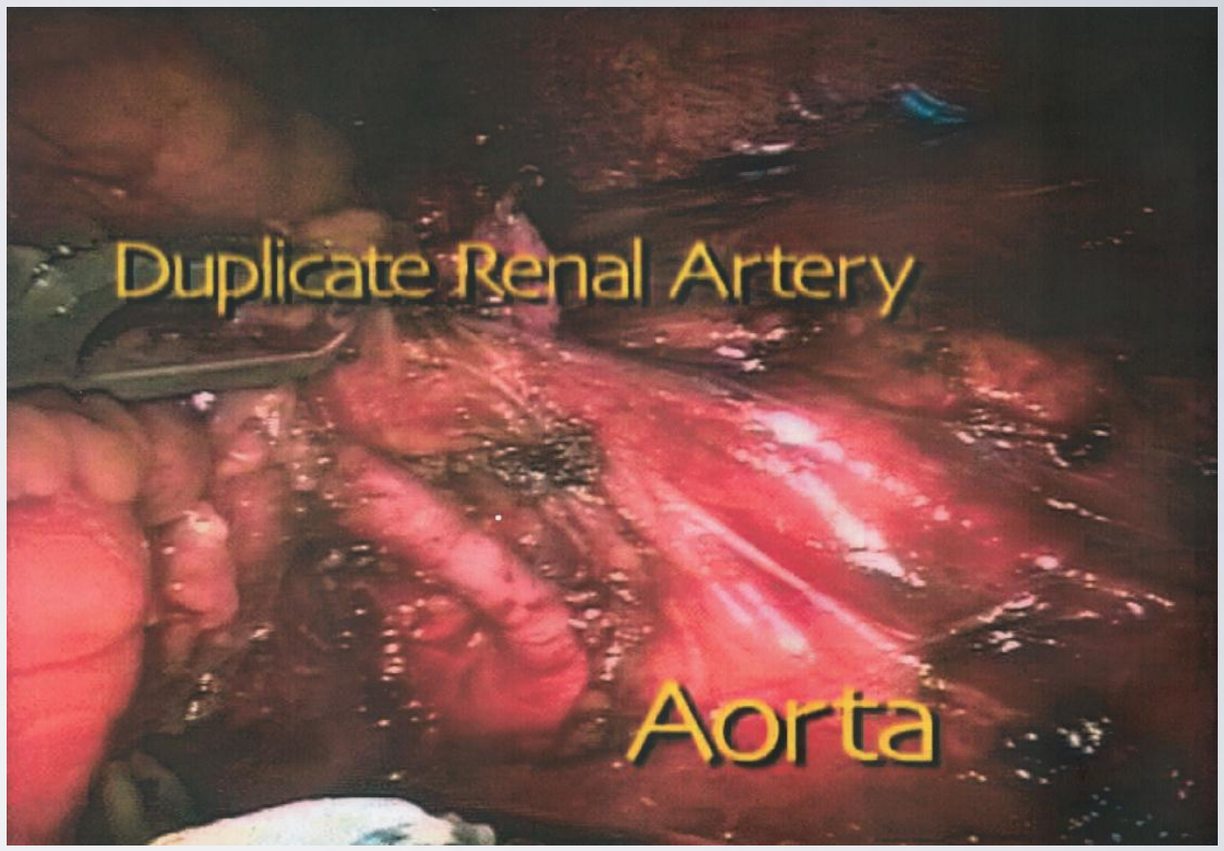
Table 2. Intraoperative and postoperative complications

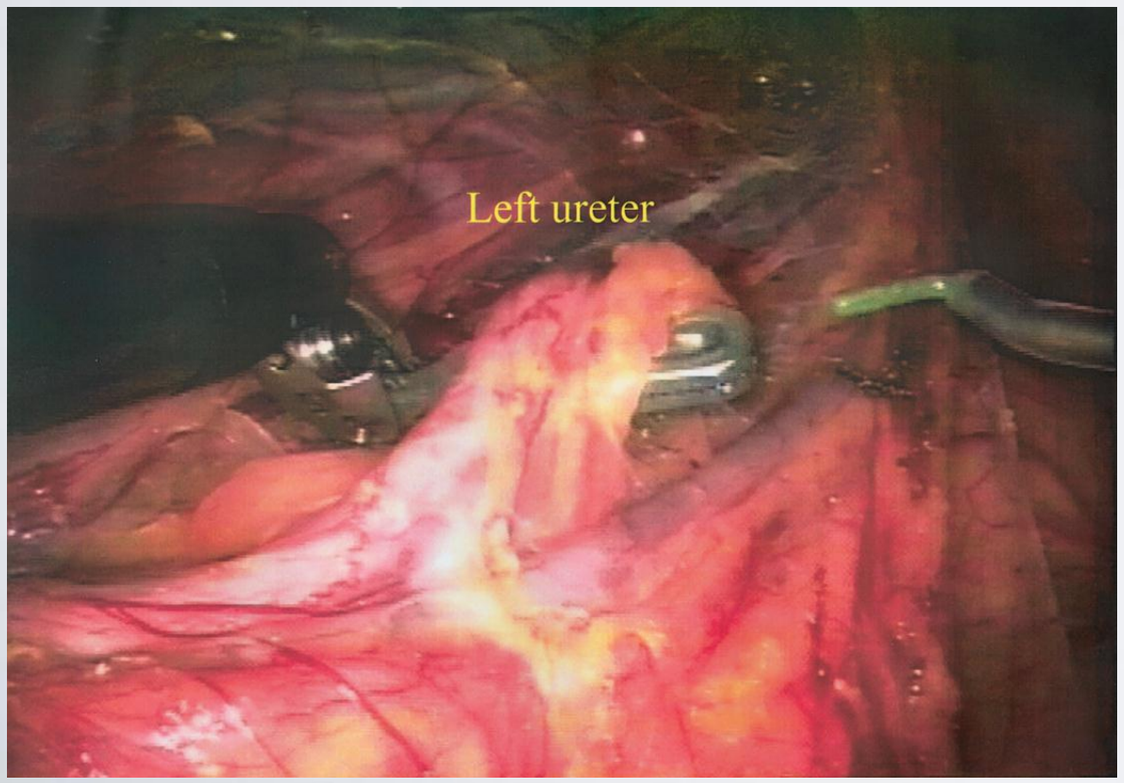
n = 214	Cases 1–74	Cases 75–144	Cases 145–214
Intraoperative			
Bleeding: n (%)	4 (6)	—	—
Postoperative			
Major: n (%)	2	(3)	
Pneumonia: n (%)	1 (1)	—	—
Pancreatitis: n (%)	1 (1)	—	—
Evisceration: n (%)			
Minor			
WI	3 (4)	2 (3)	3 (4)
Ileus	6 (8)	3 (4)	2 (3)
Ventral hernia	1 (1)	—	—
Total: n (%)	18 (24)	5 (7)	5 (7)

WI, wound infection

Surg Endosc 2007;21:1512-17.







Transplantation 2002;73:1474-9

Comparisons Between Techniques

Table 3. Comparison of perioperative variables among centers with large experience

Study	No. of patients	Approach	BMI	Vascular. anomalies (%)	Surgical time (min)	WIT (s)	EBL (ml)	Conversion (% patients)
Melcher [20]	530	LDN	26 ± 4	17	196	n/a	n/a	0.2
Leventhal [18]	500	LDN	28 ± 5	23	n/a	2.6	154–160	1.8
Su [29]	381	LDN	n/a	n/a	253	4.9	344	2.1
Jacobs [14]	738	LDN			202	2.8	128	1.6
Buell [6]	100	HALDN	n/a	n/a	234	3.0	137	2
Current	213	RHADN	29 ± 6	29	150	1.38	82	1.8

BMI, body mass index; WIT, warm isquemia time; EBL, estimated blood loss; LDN, laparoscopic donor nephrectomy; HALDN, hand assisted laparoscopic donor nephrectomy; RHADN, robotic hand-assisted donor nephrectomies

- Many single-center reports of multiple combinations of robotic/SILS/NOTES
- Few randomized trials comparing techniques; few meta-analyses; no registries
- Most studies demonstrate comparable donor outcomes
- Most studies demonstrate comparable recipient outcomes

Surg Endosc 2007;21:1512-17.

New Reports

- NOTES/SILS + robot + transvaginal extraction: case reports
  - Pietrabissa et al, Italy. *Am J Transplant* 2010;10:2708-11.
  - Kaouk et al, Cleveland Clinic. *Urology* 2012;80:1171-5.
- Robotic kidney & partial pancreas recovery
  - Oberholzer et al, Univ of Illinois at Chicago. *J Hepatobiliary Pancreat Sci* 2010;17:97-100.
- To be continued . . .

Do these techniques improve patient outcomes or safety?

Perioperative Mortality and Long-term Survival Following Live Kidney Donation

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Abimereki D. Muzaale, MD, MPH
Brian S. Caffo, PhD
Shruti H. Mehta, PhD
Andrew L. Singer, MD, PhD
Sarah E. Taranto
Maureen A. McBride, PhD
Robert A. Montgomery, MD, DPhil

Context More than 6000 healthy US individuals every year undergo nephrectomy for the purposes of live donation; however, safety remains in question because longitudinal outcome studies have occurred at single centers with limited generalizability.

Objectives To study national trends in live kidney donor selection and outcome, to estimate short-term operative risk in various strata of live donors, and to compare long-term death rates with a matched cohort of nondonors who are as similar to the donor cohort as possible and as free as possible from contraindications to live donation.

Design, Setting, and Participants Live donors were drawn from a mandated national registry of 80 347 live kidney donors in the United States between April 1, 1994, and March 31, 2009. Median (interquartile range) follow-up was 6.3 (3.2-9.8) years.

- 1994-2009 UNOS living donor data & cohort from NHANES
- Deaths: 3.1/10,000 versus 7/10,000 in open era
- Higher risk of death:
  - Men (RR 3.0)
  - Black (RR 3.1)
  - Hypertensive donors (RR 27.1)
- But not higher than cohort matched for demographics & comorbidities

JAMA 2010;303:959-66.

Current Living Donor Outcomes

- 1998-2010 NIS data (69,117 donors, 89% of all) & compared to patients having lap appy, chole, & nephrectomy
  - Peri-op complications in 7.9%, decreased over time
  - Median LOS decreased from 3.7 to 2.5 days
  - LOS correlated with obesity, hypertension, depression, pulmonary disorders
  - Complications and LOS were similar to patients having lap appy or lap chole and less than lap nephrectomy for non-metastatic cancer

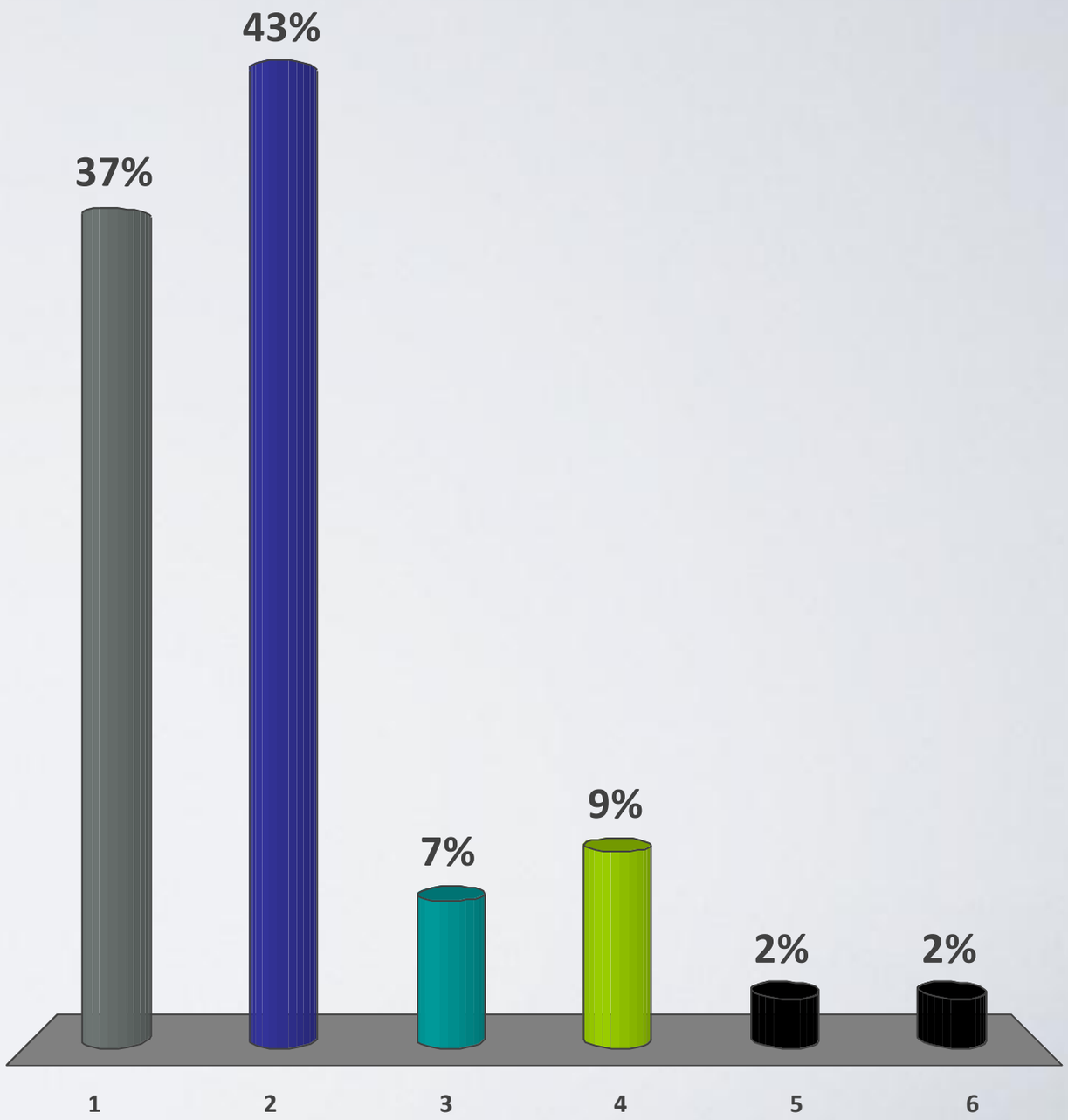
Clin J Am Soc Nephrol 2013:Sep 26 [E

Is It Better?

Step	Advantages	Disadvantages
Laparoscopic versus Open	Decreased pain, shorter hospital stay, faster recovery, better cosmesis	Warm ischemic time, bleeding/safety, learning curve, training
SILS/NOTES versus Laparoscopic	Decreased wound morbidity, better cosmesis	Yuck factor, increased technical difficulty, limited applicability (i.e., females only for transvaginal extraction)
Robotic versus Laparoscopic	Better surgical dexterity (potential for longer vessels), comfort of surgeon, 3-D visualization	Cost, learning curve, (warm ischemia)

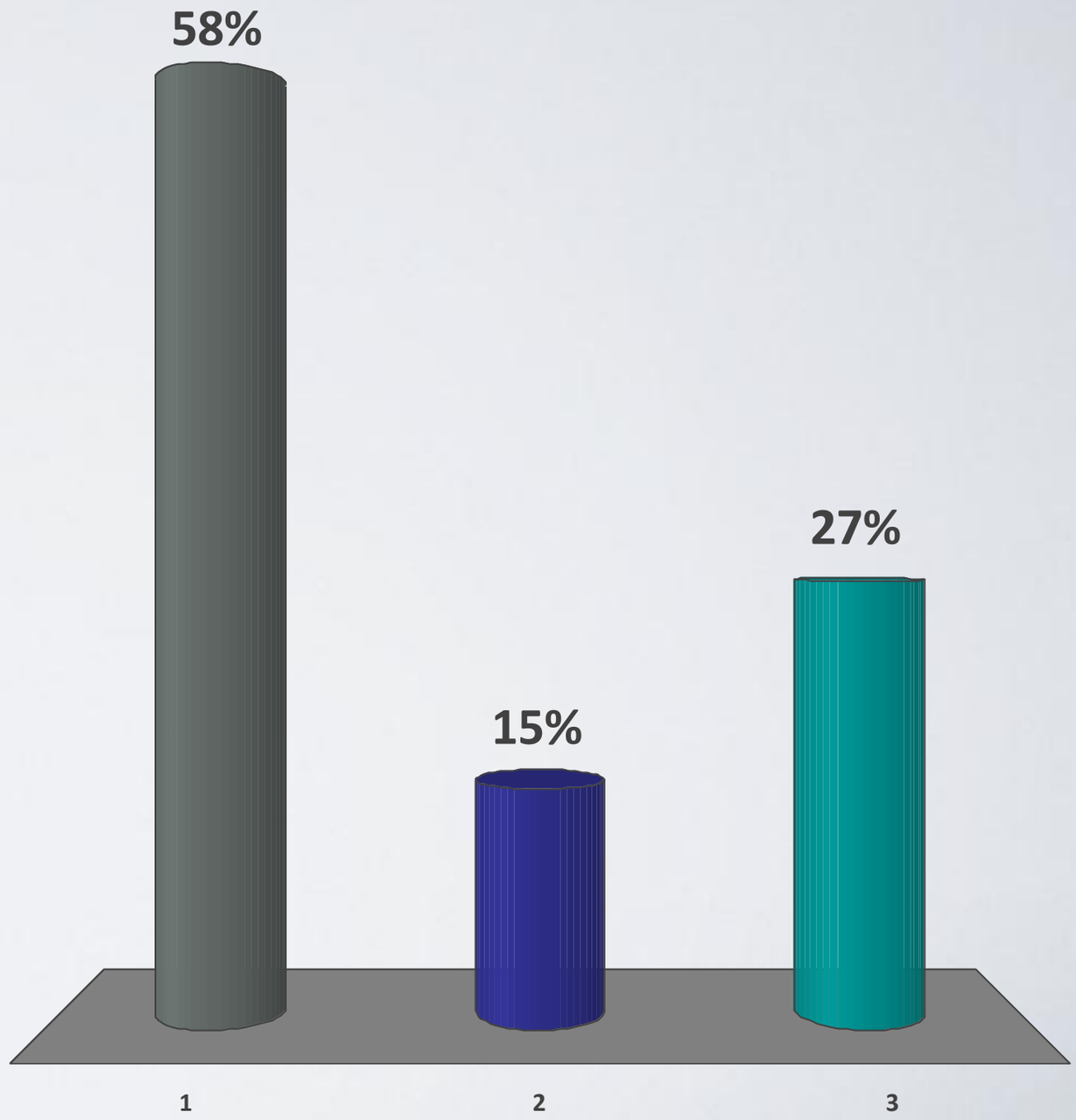
What techniques of living donor nephrectomy have you seen in training?

1. Pure laparoscopic
2. Laparoscopic, hand-assisted
3. SILS laparoscopic
4. Robotic, pure lap or hand-assisted
5. NOTES
6. None



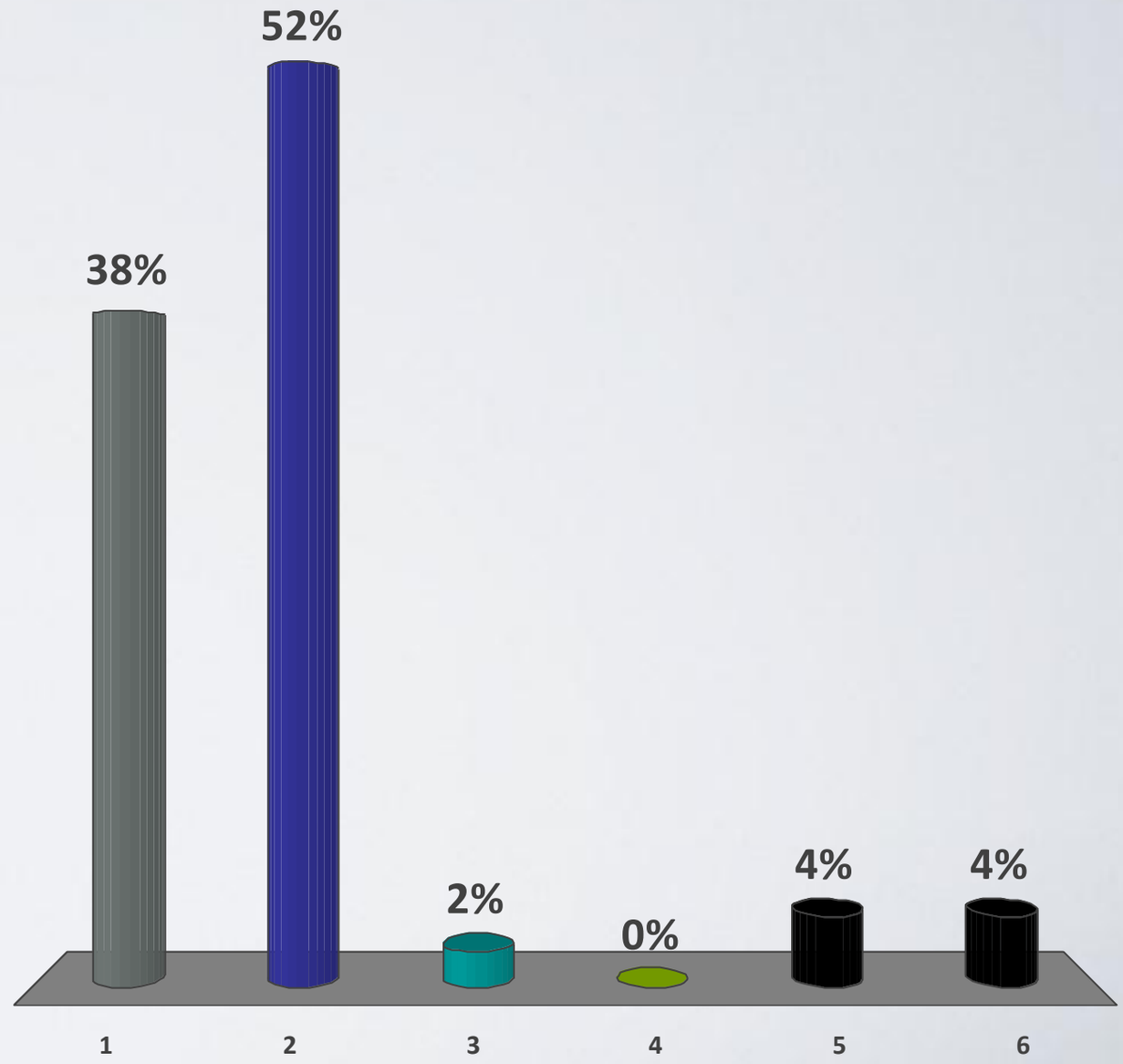
What is your comfort level with open donor nephrectomy?

1. Have not seen one in fellowship
2. Have seen <5
3. Comfortable performing open donor nephrectomy



Which technique will you use for your first living donor nephrectomy in practice?

1. Pure laparoscopic
2. Laparoscopic, hand-assisted
3. SILS laparoscopic
4. NOTES laparoscopic
5. Robotic, pure lap or hand-assisted
6. Open



Recipient Procedures

Robotic & Laparoscopic Kidney Transplant

- Robotic transabdominal kidney transplant (Benedetti, UIC, 2010)
- Pure laparoscopic kidney transplant
  - Rosales et al. *Eur Urol* 2010;57:164-7.
    - 1case of LDRT; 240m case time, 53m anastomosis time
    - LOS 14 days; discharge creatinine 73umol/l (0.82g/dL)
- Modi, India, 2011: 4 cases

2010 Robotic Recipient Procedure

American Journal of Transplantation 2010; 10: 1478–1482
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2010.03116.x

Case Report

Robotic Transabdominal Kidney Transplantation in a Morbidly Obese Patient

P. Giulianotti, V. Gorodner, F. Sbrana, I. Tzvetanov, H. Jeon, F. Bianco, K. Kinzer, J. Oberholzer* and E. Benedetti

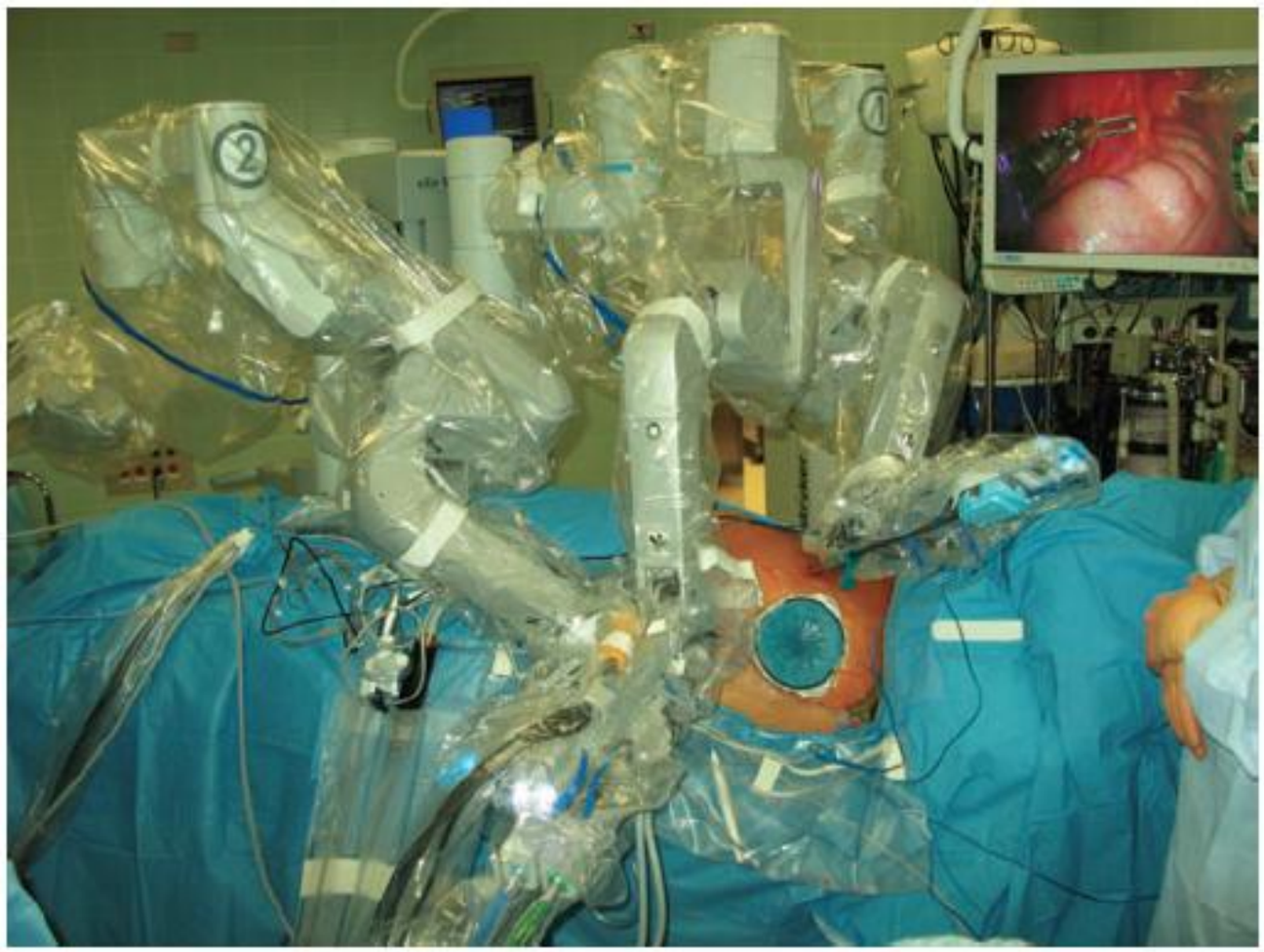
tend not to list morbidly obese patients for kidney transplantation.

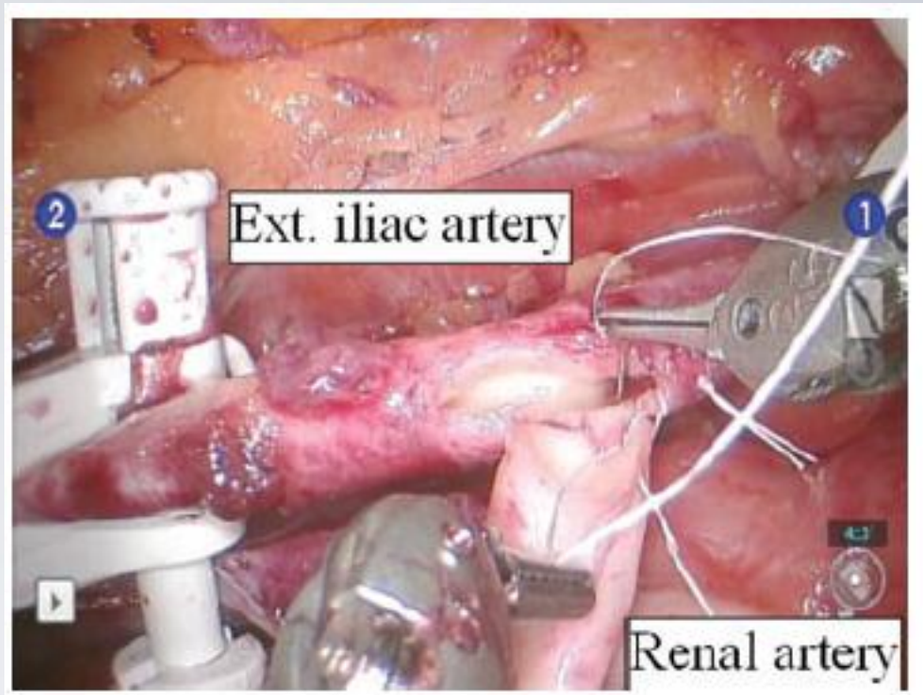
Minimally invasive surgical techniques have revolutionized

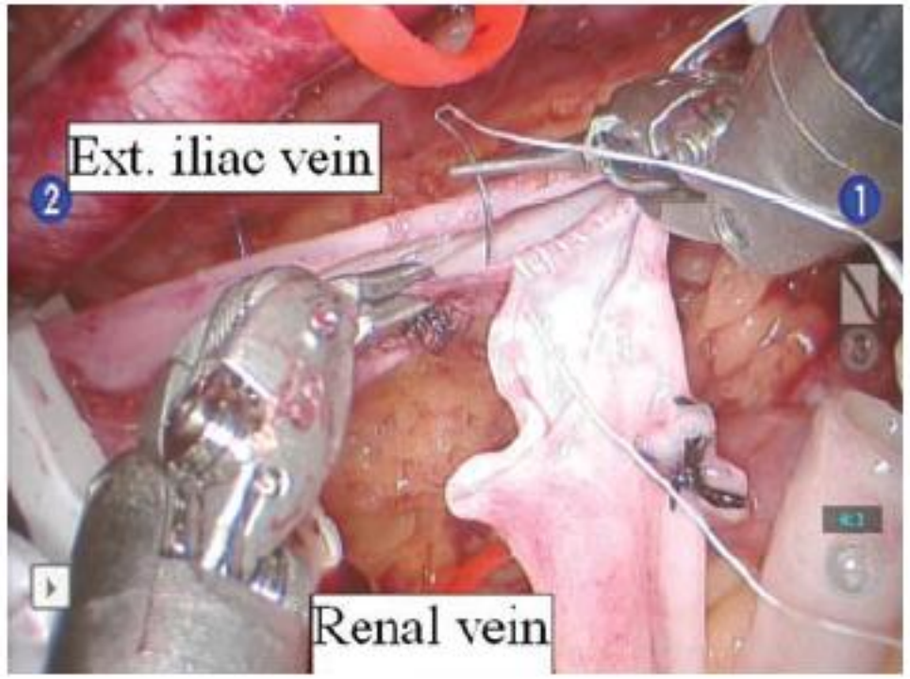
Technique & Outcome

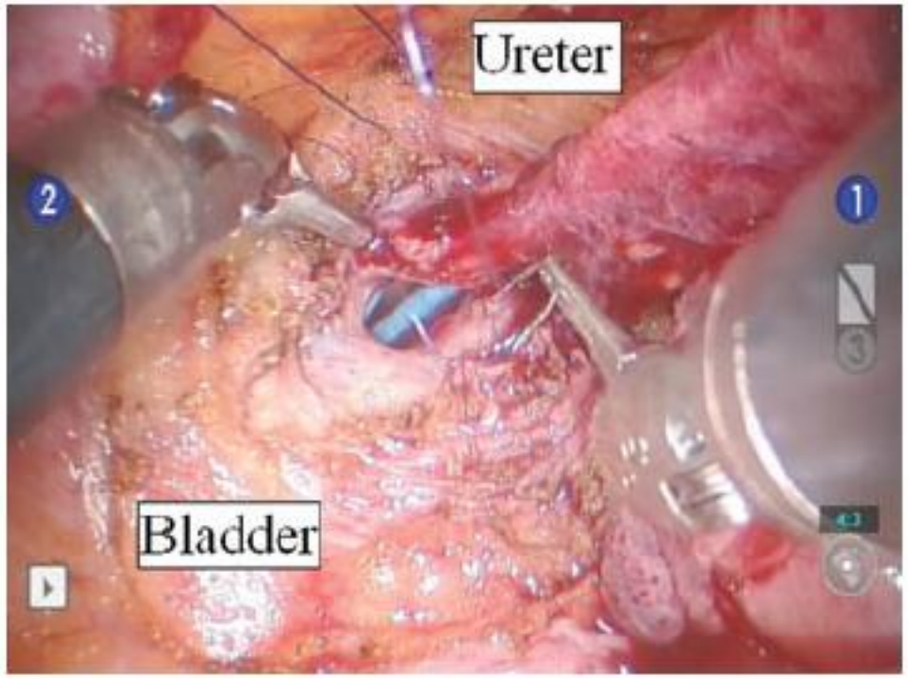
- 29yo woman with BMI 41 received a deceased donor kidney
- 7cm periumbilical incision + 4 other ports
- Right colon mobilized
- External iliac vessels exposed & clamped with plastic bulldogs
- Vascular anastomoses with 6-0 Goretex
- Two-layer bladder anastomosis with stent
- 11 hours CIT; 50 min WIT; immediate function with discharge creatinine 1.3 (POD5)

Am J Transplant 2010;10:1478-82.









Am J Transplant 2010;10:1478-82.

Table 2: Robotic kidney transplant and control patient intraoperative outcomes

	Robotic transplant (n = 28)	Controls (n = 28)	p-Value
Surgery			
Cold ischemia time (hours; n = 28/18), mean (SD)	2.8 (3.6)	2.0 (4.5)	0.48
Warm ischemia time (minutes; n = 28/19), mean (SD)	47.7 (7.8)	49.2 (25.2)	0.77
Blood loss (mls; n = 27/20), mean (SD)	110.2 (75.2)	120.8 (102.4)	0.69
Intraoperative blood transfusion, No. (%)	0	1 (3.6)	0.99
Intraoperative vascular complication, No. (%)	0	2 (7.1)	0.49
Induction: Thymoglobulin/basiliximab/daclizumab, No. (%)	21/7/0 (75.0/25.0/0)	21/2/5 (75.0/7.1/17.9)	0.02
Maintenance: Tacrolimus/neoral/sirolimus/ tacrolimus+sirolimus/tacrolimus +MMF, No. (%)	23/3/0/0/2 (82.1/10.7/0/0/7.1)	23/3/1/1/0 (82.1/10.7/3.6/3.6/0)	0.41
Donor			
Living donor, No. (%)	26 (92.9)	26 (92.9)	
Related donor (n = 26/26), No. (%)	20 (76.9)	17 (65.4)	0.36
Robotic donor nephrectomy (n = 26/26), No. (%)	26 (100)	26 (100)	
Age (years; n = 27/26), mean (SD)	32.3 (10.1)	34.3 (11.8)	0.52
Gender (male; n = 28/26), No. (%)	16 (57.1)	9 (34.6)	0.10
BMI (kg/m^2; n = 20/26), mean (SD)	29.4 (7.1)	30.7 (5.9)	0.52
Vascular anomalies (n = 28/21), No. (%)	2 (7.1)	5 (23.8)	0.12

BMI = body mass index; MMF = mycophenolate mofetil; SD = standard deviation.

Am J Transplant 2013:13:721-8.

Table 3: Robotic kidney transplant and control patient 6-month outcomes

	Robotic transplant (n = 28)	Controls (n = 28)	p-Value
Surgical outcomes			
Delayed graft function, No. (%)	1 (3.6)	0	0.99
Surgical biopsy*, No. (%)	1 (3.6)	0	0.01
Wound complications, No. (%)	1 (3.6)	8 (28.6)	0.02
Wound infections, No. (%)	0	8 (28.6)	0.004
Creatinine at discharge (mg/dL), mean (SD)	2.0 (1.4)	1.4 (0.5)	0.04
Creatinine at 6 months (mg/dL), mean (SD)	1.5 (0.4)	1.6 (0.6)	0.47
Graft survival at 6 months, No. (%)	28 (100)	28 (100)	
Patient survival at 6 months, No. (%)	28 (100)	28 (100)	
Resource utilization			
Hospital days for transplant, mean (SD)	8.2 (4.5)	8.1 (5.3)	0.98
Total hospital days over 6 months, mean (SD)	10.1 (10.2)	58.1 (37.3)	0.69
Readmission over 6 months, mean (SD)	1.6 (2.0)	1.5 (1.5)	0.82
Reoperation over 6 months, No. (%)	0	1 (3.6)	0.99
Hospital costs for transplant ($; n = 28/25), mean (SD)	75,148	60,552	0.02
Total hospital costs over 6 months ($), mean (SD)	86,272	66,487	0.04
Total follow-up (months), mean (SD)	12.0 (6.0)	35.7 (17.2)	<0.001
Co-morbidities			
Incident diabetes mellitus, No. (%)	3 (10.7)	0	0.24
Polyoma virus infection, No. (%)	2 (7.1)	1 (3.6)	0.99
Pulmonary embolism, No. (%)	1 (3.6)	2 (7.1)	0.99
Stroke, No. (%)	1 (3.6)	1 (3.6)	
CMV viremia, No. (%)	1 (3.6)	0	0.99
Fungal pneumonia, No. (%)	1 (3.6)	0	0.99
Septic shock, No. (%)	1 (3.6)	0	0.99
Rejection			
ACR, No. (%)	3 (10.7)	3 (10.7)	
AMR, No. (%)	3 (10.7)	2 (7.1)	0.99
ACR + AMR, No. (%)	1 (3.6)	0 (0)	0.99
Splenectomy, No. (%)	3 (10.7)	0 (0)	0.24

*Surgical biopsies were performed by the laparoscopic technique and one was converted to open procedure by a mini McBurney incision directly over the graft.

ACR = acute cellular rejection; AMR = antibody-mediated rejection; CMV = cytomegalovirus;.

To convert creatinine (mg/dL) to SI units (umol/L), multiply by 88.4.

Wound infections: 0 versus 8 (29%)

Cr at DC: 2.0 vs 1.4

Cr at 6m: 1.5 vs 1.6

Total Hospital Cost for 6m: $96,272 vs $66,4

Am J Transplant 2013:13:721-8.

Points to Consider

- Higher early creatinine (equal by 6 months); ? effect of pneumoperitoneum as WIT's were similar
- Intraperitoneal location of kidney--harder to biopsy
- Increased technical complexities may limit broad adoption of technique
- Increased cost despite fewer complications

Am J Transplant 2013:13:721-8.

2011 Laparoscopic Kidney Transplant

American Journal of Transplantation 2011; 11: 1320–1324
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2011.03512.x

Case Report

Laparoscopic Kidney Transplantation: An Initial Experience

P. Modi*, J. Rizvi, B. Pal, R. Bharadwaj, P. Trivedi, A. Trivedi, K. Patel, K. Shah, J. Vyas, S. Sharma, K. Shah, R. Chauhan and H. Trivedi

Introduction

Laparoscopic donor nephrectomy (LDN) was performed first time in 1995 (1). Since then many centers have

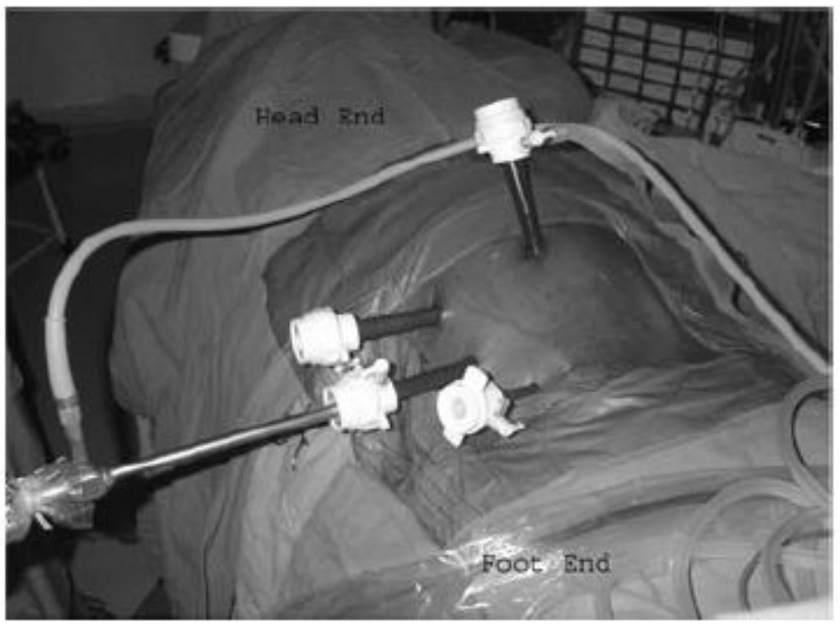


Figure 1: Port placement. Umbilical port was used for retraction of bowel while three lateral ports on the other sides were used for vascular anastomosis. For ureteral reimplantation, laparoscope was shifted to the upper lateral port.

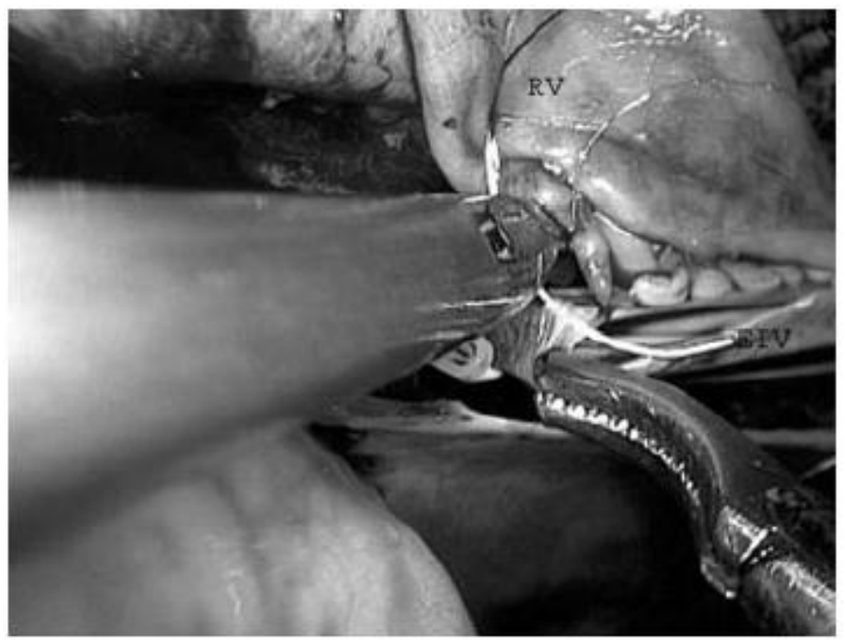


Figure 2: (A) Renal vein (RV) anastomosed to external iliac vein (EV) in end to side fashion.

Laparoscopic Recipient Procedure

- Deceased donor kidney pairs
- Left kidney placed laparoscopically
- Right kidney placed open

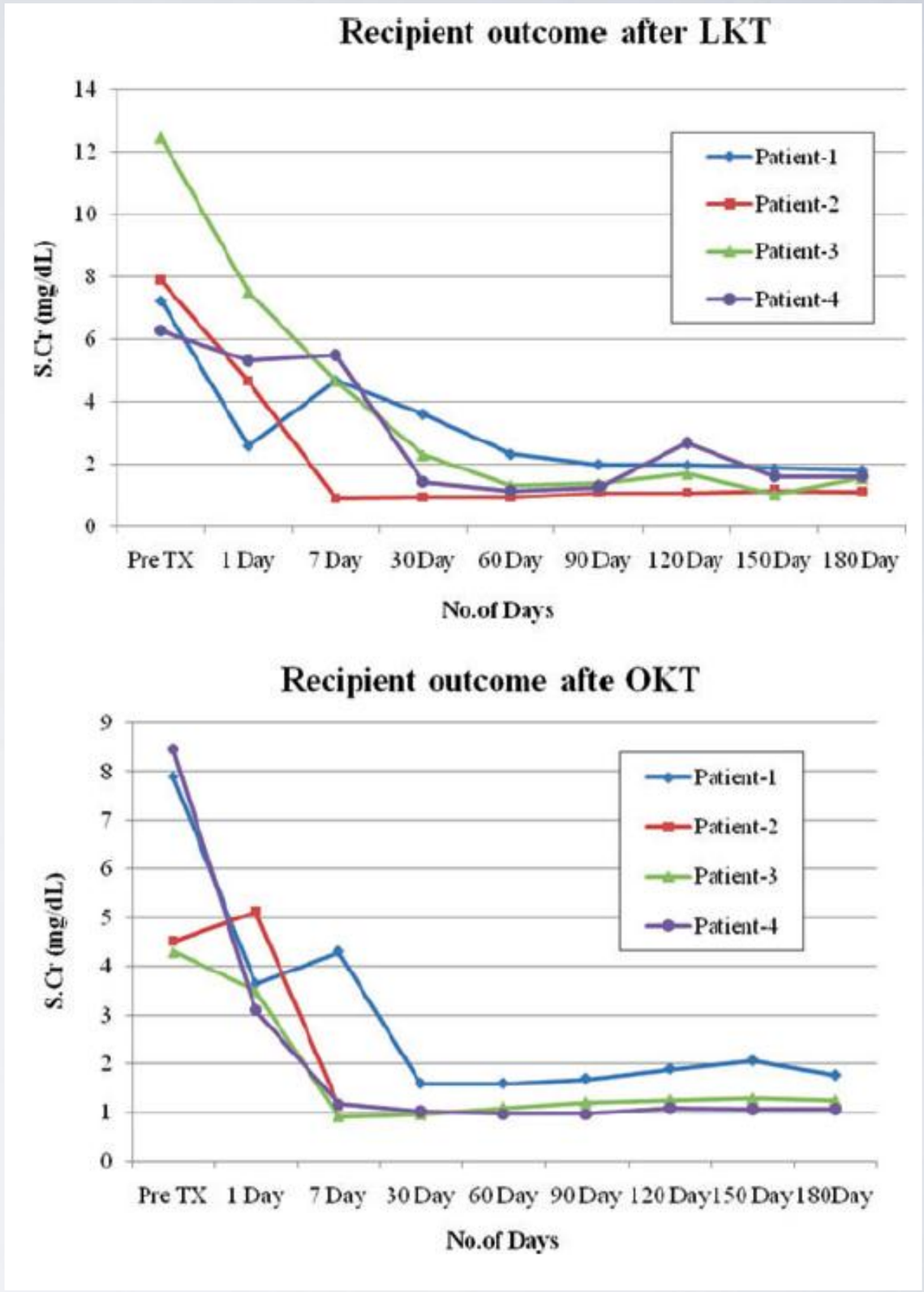
Table 1: Demography of donors and recipients and intraoperative data

	Donor		Recipient											
			Age/Sex/BMI (Kg/m^2)				Cold Ischemia time (hours)		Anastomosis time (minutes)		Operation time (hours)		Estimated blood loss (mL)	
No	Age/sex	S. Creatinine (mg/dL) at time of procurement	LKT	BMI	OKT	BMI	LKT	OKT	LKT	OKT	LKT	OKT	LKT	OKT
1	65/M	2.4	48/M	18.6	52/M	21.5	14	13	72	40	5	2.5	350	40
2	62/ F	1.2	31/M	20.4	26/M	23.8	4	4	60	36	3.5	2.4	100	80
3	65/M	1.9	25/M	21.3	21/F	19.9	4.2	4	62	30	3.5	2.5	30	80
4	65/M	1.2	45/M	22.4	17/F	20.3	11.5	10.5	66	38	3.9	2.8	45	100

Am J Transplant 2011;11:1320-4.

Technique & Outcomes

- 7cm incision in lap recipients vs 18.4cm in open group
- Used ForceTriad™(similar to Ligasure™) on lymphatics
- Vessel loops on iliac vessels
- No ureteral stents
- 1 case of DGF in each group from donor w/ elevated creatinine



Am J Transplant 2011;11:1320-4.

American Journal of Transplantation 2011; 11: 1121–1122
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2011.03510.x

Editorial

Laparoscopic Kidney Transplantation—Novel or Novelty?

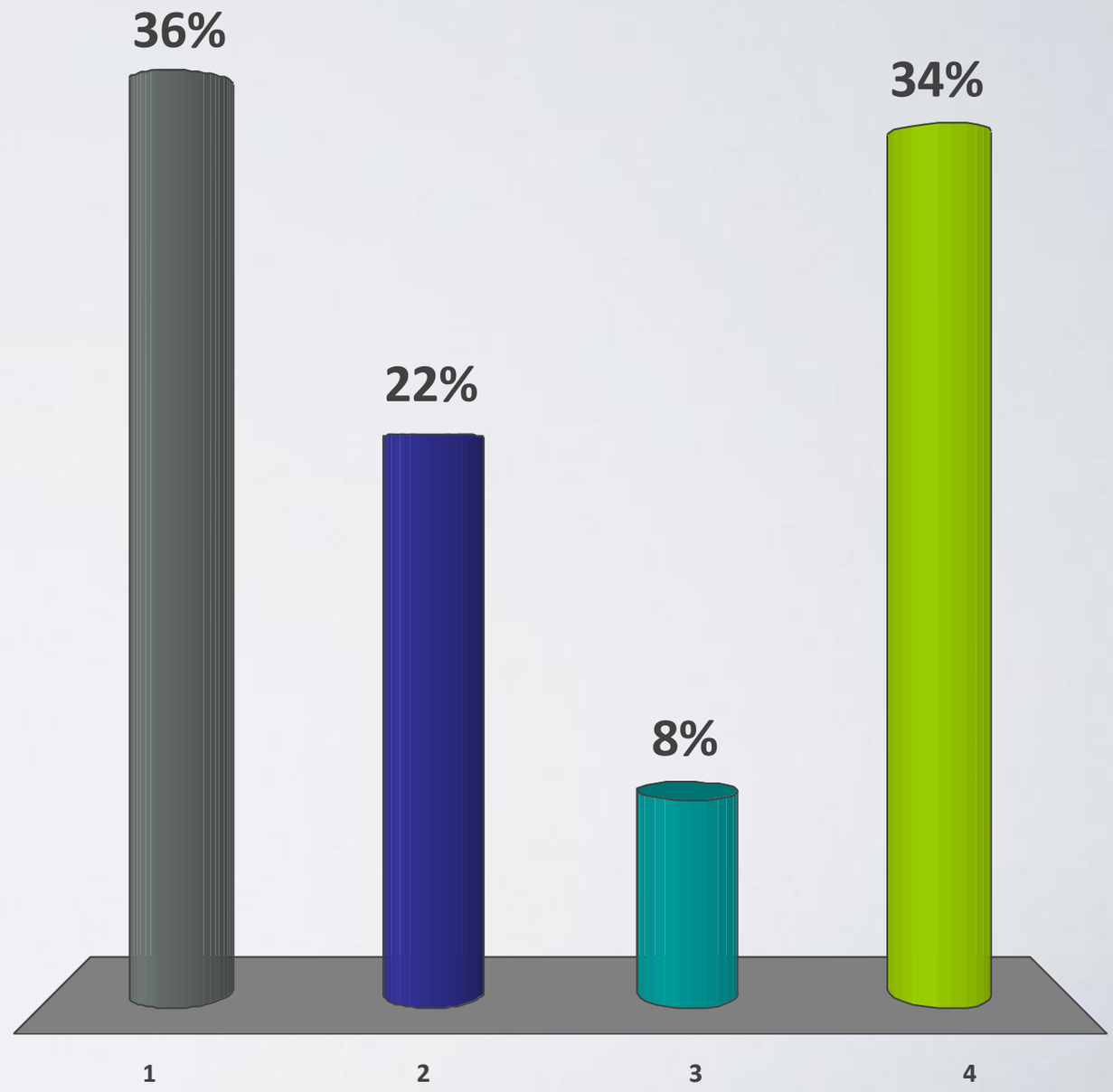
E. Benedetti[a] and R. Shapiro[b]

vascular anastomosis and the uretero-neocystostomy have been performed conventionally, and the only claim to 'min-

- What do we gain with a laparoscopic or robotic approach?
- Perhaps decreased wound morbidity
  - More important in obese recipients where surgical site infection has been linked to poorer graft outcome

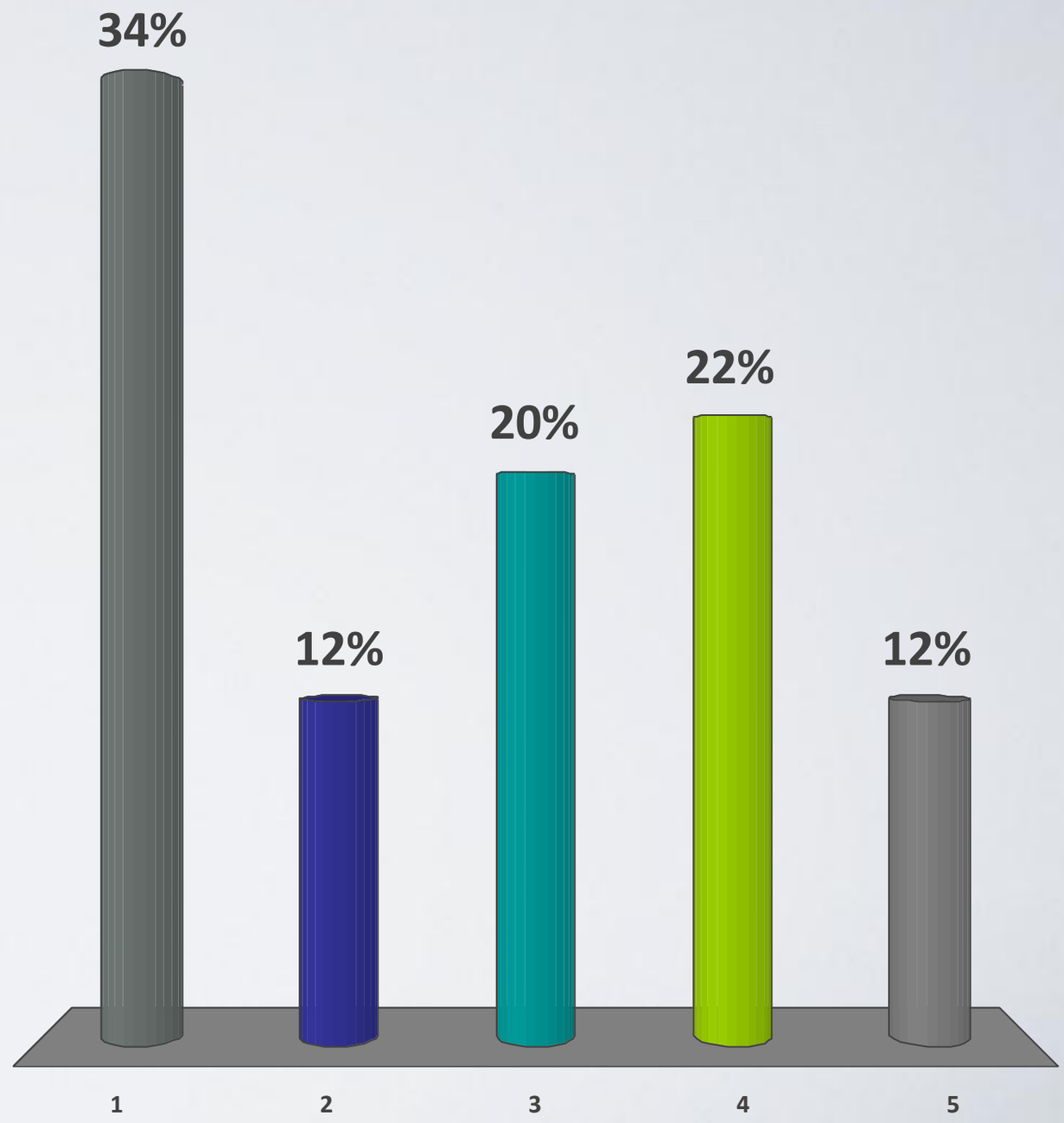
In your opinion, what is the role for laparoscopic or robotic kidney transplantation?

1. No role, open techniques are suitable for all recipients
2. No role, these techniques are too expensive for the benefit gained
3. Suitable for all recipients
4. Suitable for obese recipients only



What experience have you had with robotic surgery during your training (residency or fellowship)

1. None
2. Simulation training for robot
3. “At the field” during a robotic case
4. Performed part of robotic case at console
5. Performed entire case at the console



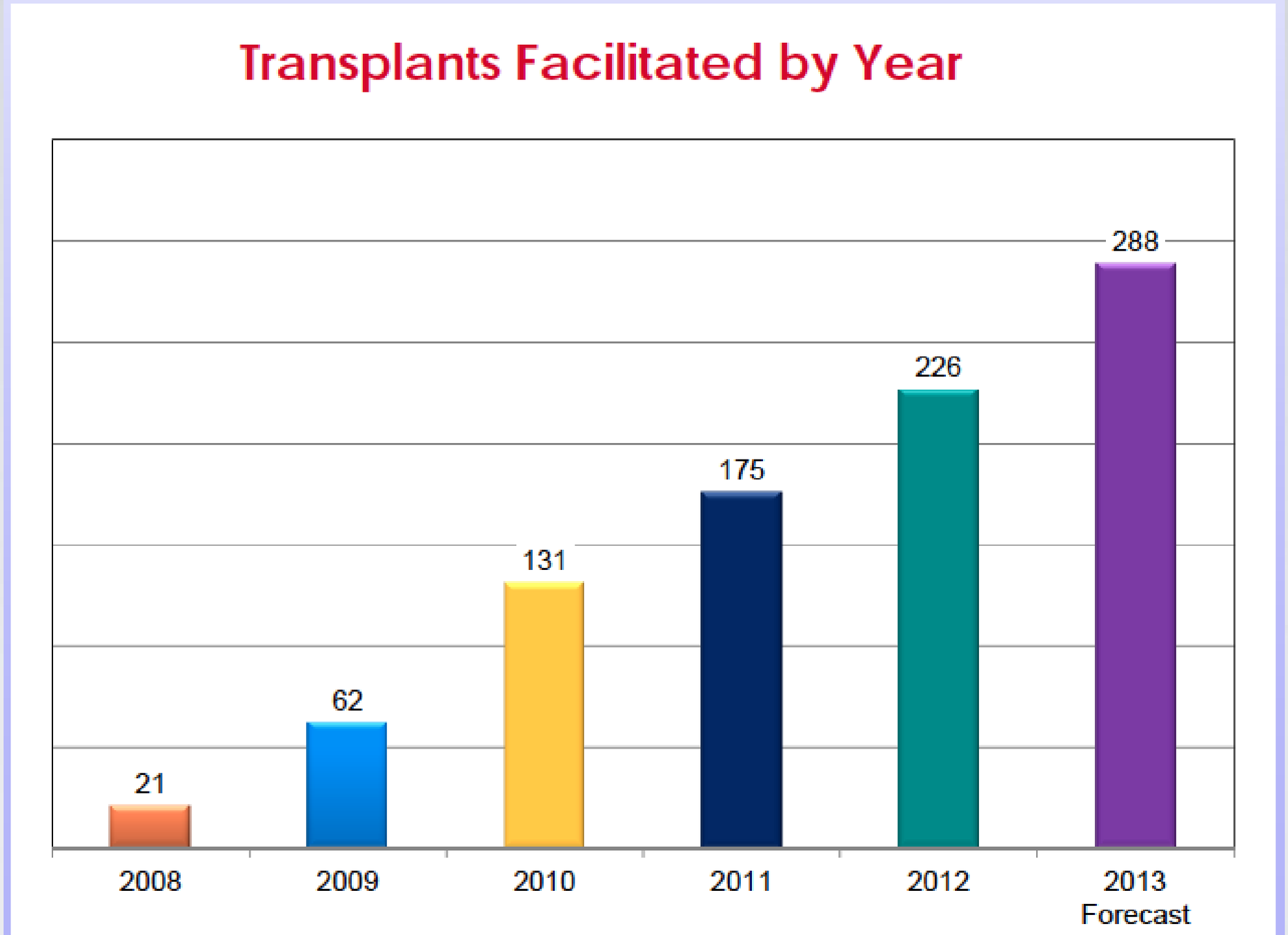
Kidney Paired Donation

SRTR 2011 Annual Data Report

Landscape

- Paired exchange allows transplant of ABO-incompatible pairs or cross-match positive pairs
  - Alternative to desensitization
  - Facilitated by non-directed donors
- Two main programs active in US: National Kidney Registry (private company) and KPD (thru UNOS)
  - NKR: 70 centers, 144 transplants as of 6/30/13 (292 donors)
  - KPD: 132 centers, 30 transplants as of 8/20/13
    - Match run 9/30/13 had 224 candidates (233 donors)

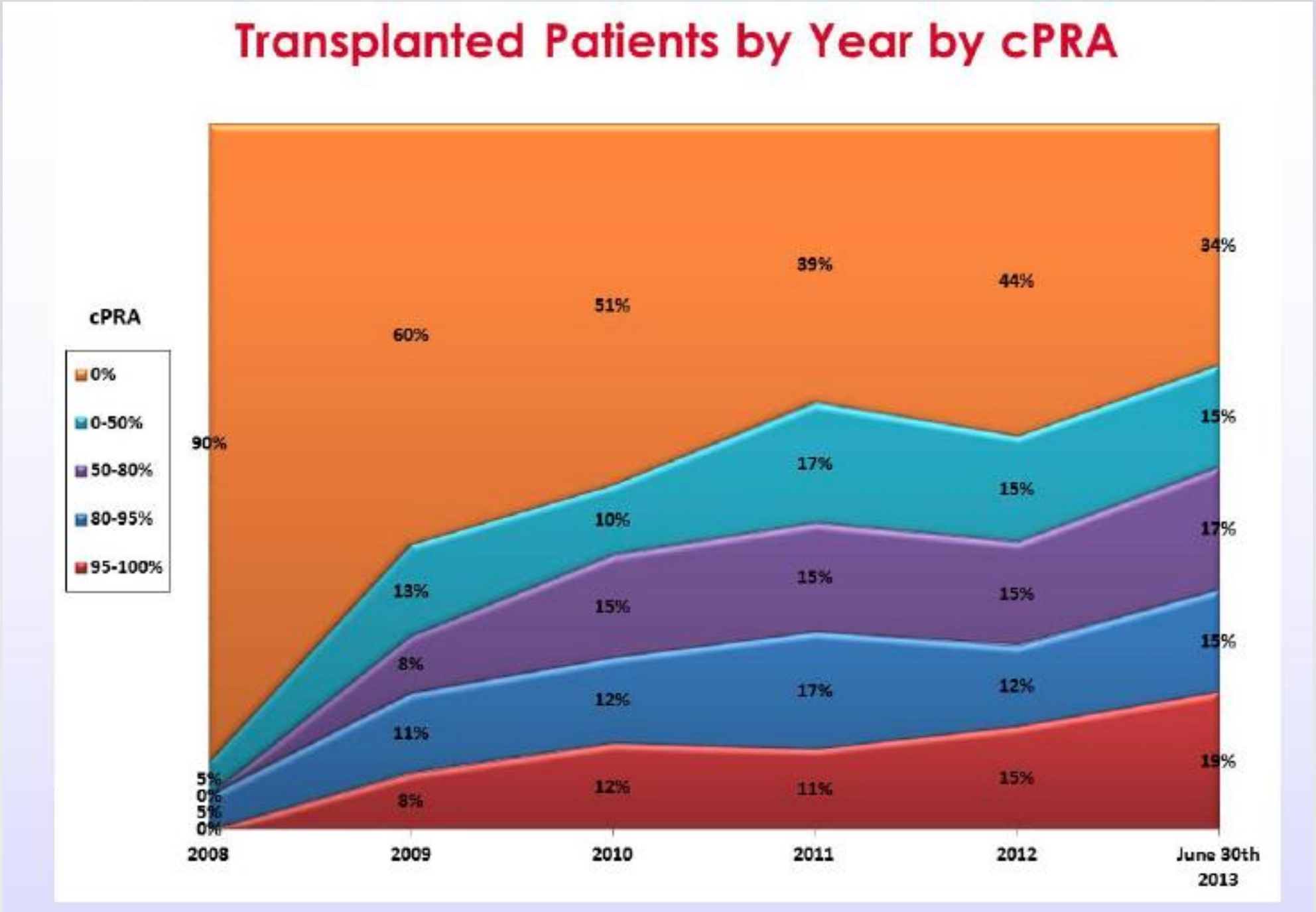
NKR Data



National Kidney Registry Paired Exchange Results Quarterly Report, June 30, 2013

www. kidneyregistry.org

NKR Data



National Kidney Registry Paired Exchange Results Quarterly Report, June 30, 2013

www. kidneyregistry.org

Kidney Paired Exchange Terms

- 2-way 3-way KPD: paired exchange, between 2 or 3 pairs
- Compatible KPD: voluntary compatible paired donation
- Domino KPD: chains
  - Open chain: never-ending, bridge donor awaiting next match run
  - Closed chain: chain ends in donation to a patient on the deceased donor waiting list
- List paired donation--living/deceased donor paired exchange; waiting list paired donation

Am J Kidney Dis 57;2010:144-51.

Patient Issues

- O imbalance: >50% of recipients on KPD waiting lists but only 30% of donors
  - Type O recipients only match 15% of the time vs 50% for other ABO-incompatibles
- Some patients will never be transplanted by exchanges alone
  - Highly sensitized patients will never find a cross-match negative donor
  - These patients may be better served by desensitization within or outside an exchange
  - Attempting desensitization may increase rate of chain breakage

Am J Kidney Dis 57;2010:144-51.

Operational Issues/Considerations

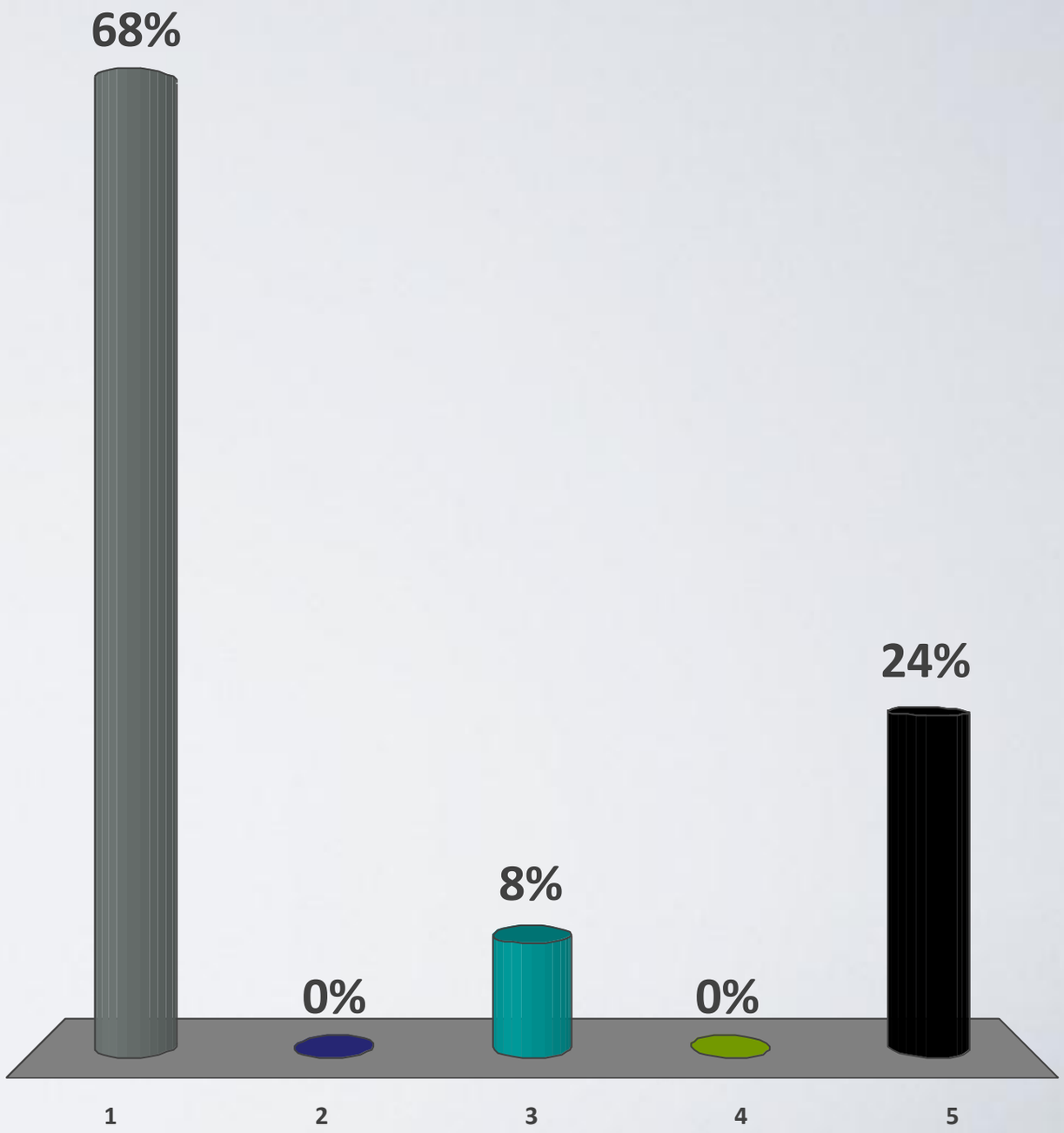
- Distance to ship: How much CIT are you willing to put on a living donor kidney?
- OR logistics: Can you get OR time to match other centers?
- Non-simultaneous ORs: Are you worried about donors backing out?
  - Does the center (exchange program) have a policy to address this possibility?
- Disclosure of donor/recipient info: Donor quality? Recipient medical/social issues?
  - Is it an “even” exchange?

Operational Issues/Considerations

- Longer chains result increased rate of chain breakage
  - Recipient illness, donor availability
  - Success of attempted desensitization
  - Cost to enroll in a matching registry
  - Match algorithm used, frequency of match runs & frequency of new pair registrations impacts rate of matches
  - Multiple registries offer fewer matches than a unified/single registry

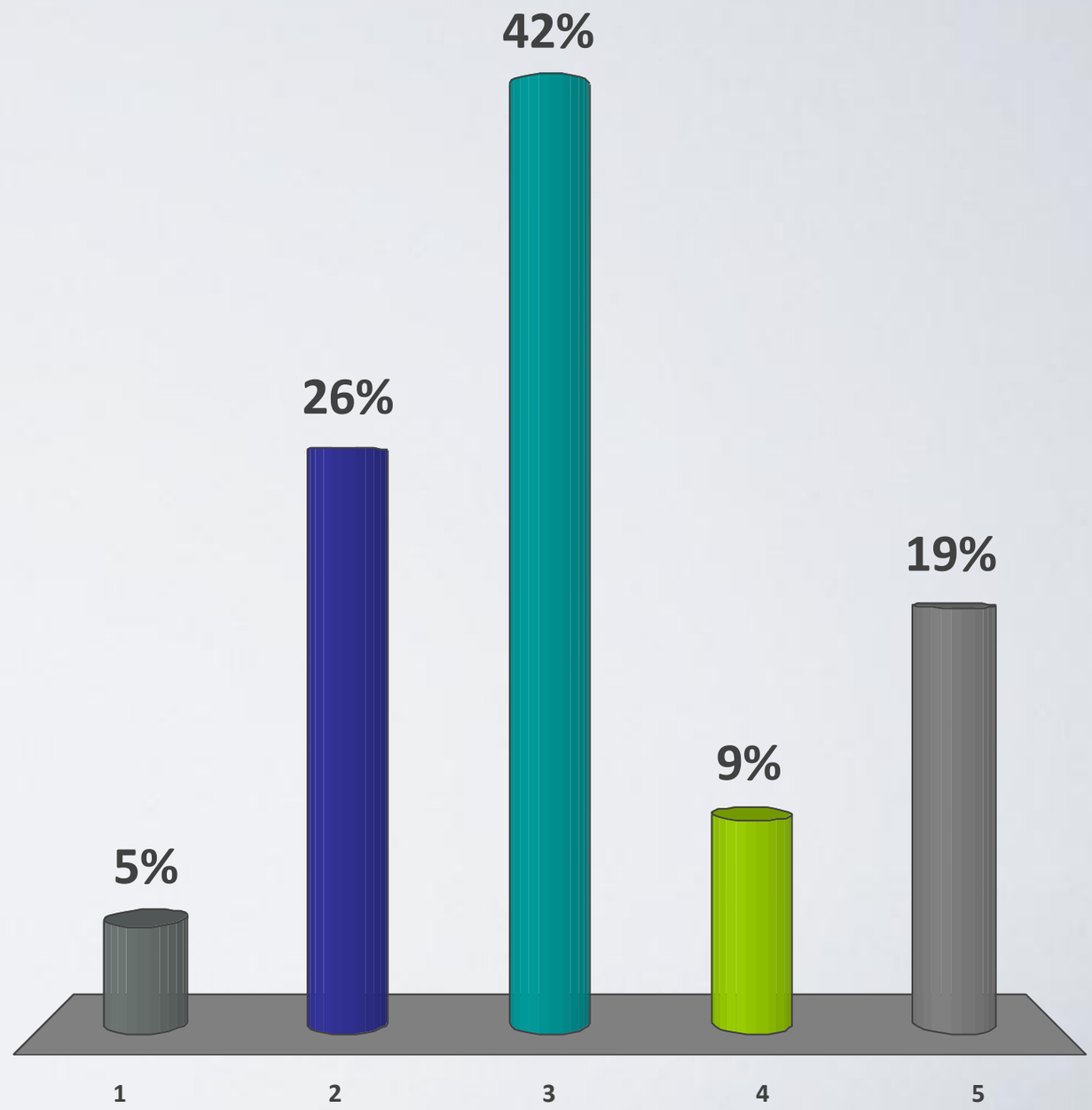
Should compatible living donor pairs be offered (or be required) to participate in exchanges?

1. All pairs should be offered the opportunity to participate in exchanges
2. All pairs should be required to participate in exchanges
3. Compatible pairs with O donors and non-O recipients should be offered
4. Compatible pairs with O donors and non-O recipients should be required to participate
5. Compatible pairs should be allowed to donate to their intended recipient



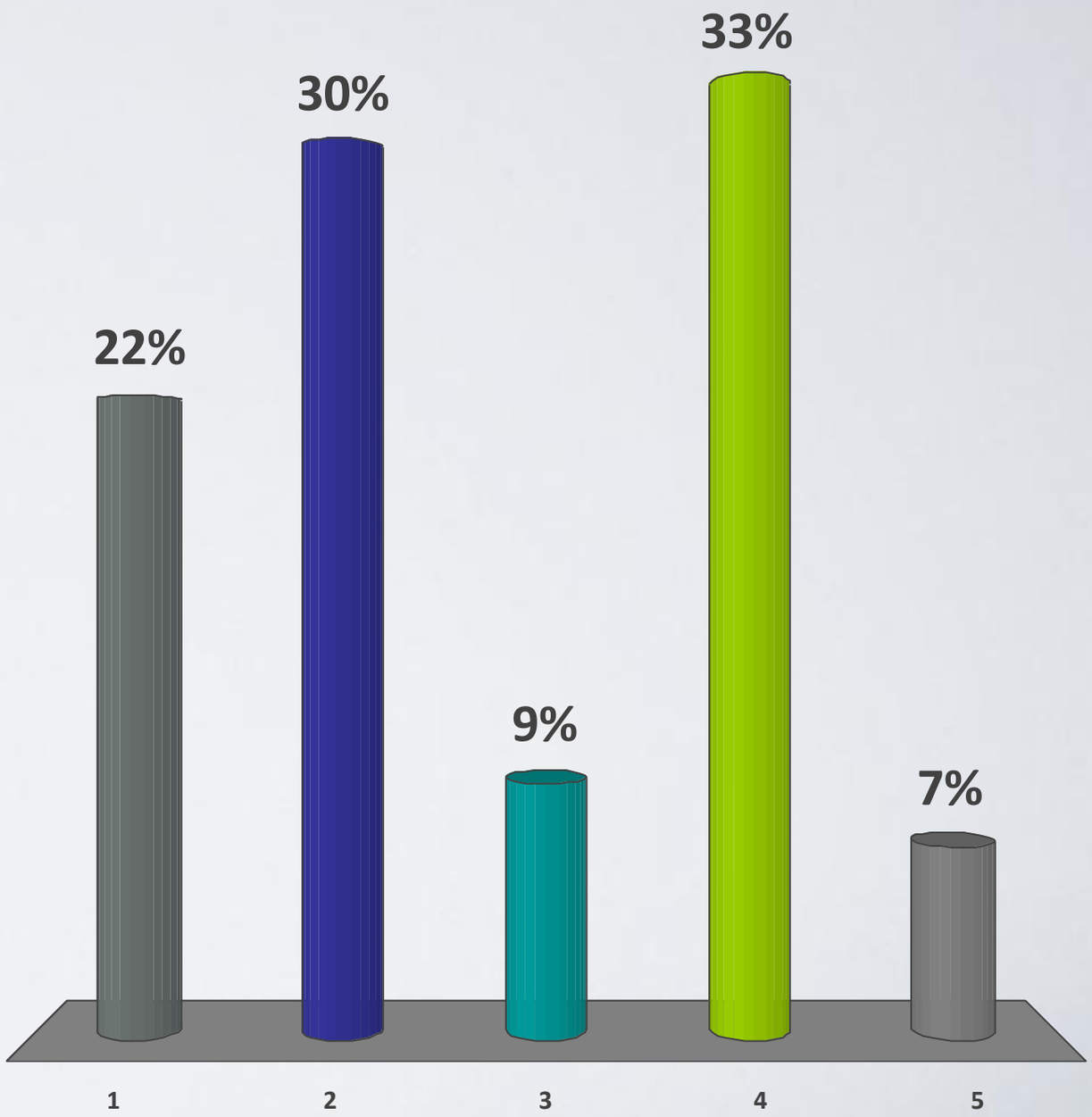
What is your absolute CIT limit for a living donor kidney in a paired exchange program?

1. 4 hours
2. 8 hours
3. 12 hours
4. 16 hours
5. 24 hours or more



Which of the following should be the priority in decision-making for match runs?

1. Greatest number of matches/transplants
2. Best HLA-matching for each pair
3. Minimizing shipping distance/CIT
4. Matching the most-sensitized patients
5. Matching patients with the longest wait time



Trends in Kidney Transplant

- Further incremental development of donor procedures
  - Need to balance risk, benefit, and cost
- Introduction of minimally invasive recipient procedures
  - Need to define appropriate cohort with most benefit
- Rapid growth of paired exchange programs
  - Aid in matching some incompatible pairs, but not all will benefit
  - Operational/ethical issues to consider

Thanks!