Supplemental Digital Content

Perioperative complications during living donor nephrectomy: Results from a multicenter cohort study
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Table of Contents
Supplemental Digital Content 1 ................................................................. 2
SDC, Materials and Methods; Image S1. Physical examination ........................................ 2
SDC, Materials and Methods; Table S1. STROBE guidelines ........................................ 3
SDC, Materials and Methods; Table S2. Measurement and definitions ................................ 6
SDC, Materials and Methods; Table S3. Classification of intraoperative complications ....... 7
SDC, Materials and Methods; Table S4. Classification of postoperative complications ...... 8
SDC, Results; Table S5. Ethnicity .............................................................................. 9
SDC, Results; Table S6. Weight characteristics .............................................................. 10
Supplemental Digital Content 2 .............................................................................. 11
Living Donor Nephrectomy Survey .............................................................................. 11
SDC, References ......................................................................................................... 13
Supplemental Digital Content 1

SDC, Materials and Methods; Image S1. Physical examination

EXAMINATION FORM

1.) Weight (no shoes) □□□□□□□□ pounds □□□□□□□□ kilograms 2.) Height □□□□□□□□ cm □□□□□□□□ inches

3.) Waist Circumference □□□□□□□□ cm □□□□□□□□ inches 4.) Hip Circumference □□□□□□□□ cm □□□□□□□□ inches

5.) Body Mass Index □□□□□□□□ kg/m² □□□□□□□□ lb/ft² or in²

6.) Interviewer Measured Blood Pressures:
   - Patient should be seated
   - Measure arm circumference - upper part of arm, at the midpoint.
   - Use large cuff if circumference of the upper part of arm at the midpoint is > 31 cm (12.2 inches)
   - Send this large cuff home with study participant for home measurements.

   * Take measurements in series with each being separated by 5 minutes.
   * Blood Pressure Machine must either be returned to centre in person or mailed back to centre using a courier after home readings completed.

6.) Arm Circumference: □□□□□□□□ cm □□□□□□□□ inches

7.) Blood Pressure Machine Cuff Size: □ regular cuff □ large cuff

8.) Omron Blood Pressure Machine Number: □□□□

9.) Blood Pressures taken during recruitment interview:

| Reading | Systolic (mmHg) | Diastolic (mmHg) |
|---------|-----------------|------------------|
| 1       |                 |                  |
| 2       |                 |                  |
| 3       |                 |                  |
| 4*      |                 |                  |
| 5*      |                 |                  |
| 6*      |                 |                  |

*Optional (take only if first 3 readings are not within study criteria)

7.) All SBP < 140 mmHg? □ yes □ no  8.) All DBP < 90 mmHg? □ yes □ no

9.) Instructions reviewed with participant? □ yes □ no
10.) Participant successfully used machine? □ yes □ no

Person completing form (please print): __________________________  __________________________
### SDC, Materials and Methods; Table S1. STROBE guidelines

| Item No | Recommendation | Reported on page |
|---------|----------------|-----------------|
| **Title and abstract** | (a) Indicate the study’s design with a commonly used term in the title or the abstract | 1 |
| | (b) Provide in the abstract an informative and balanced summary of what was done and what was found | 4 |
| **Introduction** | Explain the scientific background and rationale for the investigation being reported | 5, 6 |
| **Objectives** | State specific objectives, including any prespecified hypotheses | 6 |
| **Methods** | Present key elements of study design early in the paper | 6 |
| Study design | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | 6, 7 |
| Setting | (a) **Cohort study**—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up | 6, 7 |
| | **Case-control study**—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls | 6, 7 |
| | **Cross-sectional study**—Give the eligibility criteria, and the sources and methods of selection of participants | 6, 7 |
| Participants | (b) **Cohort study**—For matched studies, give matching criteria and number of exposed and unexposed | N/A |
| | **Case-control study**—For matched studies, give matching criteria and the number of controls per case | N/A |
| Variables | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | 7, 8, Supplement |
| Data sources/ measurement | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | 7, 8, Supplement |
| Bias | Describe any efforts to address potential sources of bias | 7-10 |
| Study size                      | 10 | Explain how the study size was arrived at | 10 |
|--------------------------------|----|------------------------------------------|----|
| Quantitative variables         | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | 9, 10 |
| Statistical methods            | 12 | *(a)* Describe all statistical methods, including those used to control for confounding | 9, 10 |
|                                |    | *(b)* Describe any methods used to examine subgroups and interactions | 9, 10, 30 |
|                                |    | *(c)* Explain how missing data were addressed | 9, 10, 30 |
|                                |    | *(d)* Cohort study—If applicable, explain how loss to follow-up was addressed | 31 |
|                                |    | Case-control study—If applicable, explain how matching of cases and controls was addressed | |
|                                |    | Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy | |
|                                |    | *(e)* Describe any sensitivity analyses | N/A |

### Results

| Participants                   | 13* | *(a)* Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | 10 |
|                                |     | *(b)* Give reasons for non-participation at each stage | 10 |
|                                |     | *(c)* Consider use of a flow diagram | 31 |
| Descriptive data               | 14* | *(a)* Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | 10, 11 |
|                                |     | *(b)* Indicate number of participants with missing data for each variable of interest | 24, 28, 30 |
|                                |     | *(c)* Cohort study—Summarise follow-up time (eg, average and total amount) | 10 |
| Outcome data                   | 15* | *Cohort study*—Report numbers of outcome events or summary measures over time | 11-13 |
|                                |     | *Case-control study*—Report numbers in each exposure category, or summary measures of exposure | |
|                                |     | *Cross-sectional study*—Report numbers of outcome events or summary measures | |
| Main results | 16 | (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | 11-13, 28-30 |
|--------------|----|-----------------------------------------------------------------|----------------|
|              |    | (b) Report category boundaries when continuous variables were categorized | 10, 11, 13    |
|              |    | (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period |                |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | 10, 11          |

**Discussion**

| Key results | 18 | Summarise key results with reference to study objectives | 13-16 |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | 17 |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | 14-18 |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | 17 |

**Other information**

| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | 2 |

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.*

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet 2007; 370:1453-7
**SDC, Materials and Methods; Table S2.** Measurement and definitions of donors’ baseline (pre-donation) health characteristics.

| Variable                  | Measurements                                                                 | Definition                                                                                     |
|---------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| **Age**                   | Calculated from date of birth to time of surgery                             | Years, median (25th, 75th), and categorical: <40 years, 40-60 years, >60 years, n (%)         |
| **Race/ethnicity**        | Self-reported race/ethnicity was collected and recorded by a research assistant using pre-specified categories (White/Caucasian; Asian [Includes Far East, Southeast Asia and Indian Subcontinent]; Aboriginal/Native Person/American Indian; Black/African American/African Canadian; Hispanic/Latino; Middle East; Other) | White/non-white, n (%)                                                                          |
| **Body mass index**       | Height (m), was self-reported at recruitment. Weight (kg) was measured at recruitment and within 30 days before surgery. Body mass index formula used was: weight (kg)/(height[m])². | Kg/m², median (25th, 75th) and Obesity: body mass index ≥ 30 kg/m² [n (%)]                     |
| **Current smoker**        | Self-reported: "In the past 30 days did you smoke any cigarettes?"          | Yes/no, n (%)                                                                                  |
| **Serum creatinine**      | Obtained from either local laboratories or from the hospital lab where the nephrectomy was performed. | μmol/L converted to (mg/dL), median (25th, 75th)                                               |
| **eGFR (from serum creatinine)** | eGFR calculated from serum creatinine using the CKD-EPI formula (141 × min (Scr/κ, 1)¹ × max(Scr/κ, 1)¹.209 × 0.993⁴κ × 1.018 [if female] x 1.159 [if black], where Scr is serum creatinine (mg/dL), κ is 0.7 for females and 0.9 for males, α is -0.329 for females and -0.411 for males, min indicates the minimum of Scr/κ or 1, and max indicates the maximum of Scr/κ or 1)⁴ | mL/min/1.73m², median (25th, 75th)                                                                |
| **Nuclear GFR**           | 774 (74%) living kidney donors underwent a radionuclide glomerular filtration rate measurement | mL/min/1.73m², median (25th, 75th) and as categorical, GFR, <80 mL/min/1.73m², n (%)           |
| **Hypertension**          | Defined as a systolic/diastolic blood pressure ≥140/90 mmHg or receipt of anti-hypertensive medication for reasons of high blood pressure. | Yes/no, n (%)                                                                                  |
SDC, Materials and Methods; Table S3. Classification of postoperative complications (Clavien-Dindo); table. Adapted for intraoperative complications

| Severity | Grade | Definition |
|----------|-------|------------|
| Minor    | I     | Any deviation from the normal intraoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions. Allowed therapeutic regimens are: drugs as antiemetics, antipyretics, analgesics, diuretics, electrolytes, and physiotherapy. |
|          | II    | Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions are also included |
| Major    | III and IV | Requiring additional surgical\(^b\), endoscopic or radiological intervention. Life-threatening complication. Single and multiorgan dysfunction |
|          | V\(^c\) | Death of a patient |

\(^a\) Table adapted from:
Dindo D, Demartines N, Clavien P-A. Classification of Surgical Complications. *Ann Surg*. 2004;240(2):205-213.
And
Serrano OK, Bangdiwala AS, Vock DM, et al. Defining the Tipping Point in Surgical Performance for Laparoscopic Donor Nephrectomy Among Transplant Surgery Fellows: A Risk-Adjusted Cumulative Summation Learning Curve Analysis. *Am J Transplant*. 2017;17(7):1868-1878.

\(^b\) Some procedures include: conversion to open and splenectomy.

\(^c\) There were no perioperative deaths.
**SDC, Materials and Methods; Table S4.** Classification of postoperative complications (Clavien-Dindo); table.  

| Grade | Definition                                                                                                                                   |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Minor |                                                                                                                                             |
| I     | Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions. Allowed therapeutic regimens are: drugs as antiemetics, antipyretics, analgesics, diuretics, electrolytes, and physiotherapy. This grade also includes wound infections opened at the bedside. |
| II    | Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions and total parenteral nutrition are also included. |
| Major |                                                                                                                                             |
| III   | Requiring surgical, endoscopic or radiological intervention                                                                                   |
| a     | Intervention not under general anesthesia                                                                                                     |
| b     | Intervention under general anesthesia                                                                                                         |
| IV    | Life-threatening complication (including CNS complications) requiring IC/ICU management                                                        |
| a     | Single organ dysfunction (including dialysis)                                                                                                 |
| b     | Multiorgan dysfunction                                                                                                                        |

*a* Table modified from: Dindo D, Demartines N, Clavien P-A. Classification of Surgical Complications. *Ann Surg.* 2004;240(2):205-213.  

*b* Brain hemorrhage, ischemic stroke, subarachnoid bleeding, but excluding transient ischemic attacks. CNS, central nervous system; IC, intermediate care; ICU, intensive care unit.  

*c* There were no perioperative deaths.
**SDC, Results; Table S5.** Ethnicity of 1042 living kidney donors from 2004-2014.

| Ethnicity                                                    | n (%)         |
|--------------------------------------------------------------|---------------|
| White/Caucasian                                              | 907 (87%)     |
| Asian\(^a\)                                                 | 62 (6%)       |
| Aboriginal/Native Person/American Indian                     | 24 (2%)       |
| Black/African American/African Canadian                      | 17 (2%)       |
| Other\(^b\)                                                 | 14 (1%)       |
| Hispanic/Latino                                              | 9 (1%)        |
| Middle East                                                 | 9 (1%)        |

\(^a\) Includes Far East, Southeast Asia and Indian Subcontinent.

\(^b\) Other includes: Caucasian & African American, Caucasian & Asian, Caucasian & East Indian, Caucasian & Japanese, Caucasian & Metis, Greek, Italian, Métis, Portuguese, Portuguese & Scottish.
**SDC, Results; Table S6.** Weight characteristics of 1041 living kidney donors from recruitment to surgery (donation). Patients had a median (25th, 75th percentiles) of 22 (10, 92) days from recruitment to donation.

| Body mass index | Weight at time of recruitment n=1041 | Weight at time of surgery n=910 |
|-----------------|--------------------------------------|----------------------------------|
| ≥30 kg/m²       | 174 (17%)                            | 185 (20%)                        |
| ≥35 kg/m²       | 25 (2%)                              | 27 (3%)                          |

| Weight change between recruitment and surgery n=910 |
|---------------------------------------------------|
| Decreased                                         | 161 (18%) |
| No change                                         | 573 (63%) |
| Gained                                            | 176 (19%) |
Supplemental Digital Content 2
Living Donor Nephrectomy Survey
1. Year of Birth

2. I completed a surgical fellowship?

3. Year of completion of surgical fellowship

4. What best describes your surgical specialty?

- General Surgery
- Transplant Surgeon
- Urology
- Vascular Surgeon
- Other

5. I received training in basic laparoscopic surgery during:

- Residency
- Fellowship

6. I received training in advanced laparoscopic surgery during:

- Residency
- Fellowship

7. I received training in laparoscopic donor nephrectomy during:

- Residency
- Fellowship

8. I received training in open donor nephrectomy surgery during:

- Residency
- Fellowship

Basic Laparoscopic Surgery:

Advanced Laparoscopic Surgery:

9. What year did you perform your first donor nephrectomy as the main surgeon?

The following questions are based on your experience during the years 2009-2014

10. On average, how many laparoscopic complete nephrectomies did you perform per year?

- In a living kidney donor:
- In a patient with a renal tumour:

11. What nephrectomy technique did you perform the most during this period?

- Open
- Straight Laparoscopic
- Hand Assisted Laparoscopic
- Retroperitoneoscopic
12. Please answer how much you agree with the following statement during the years 2009-2014:

(1=Strongly Disagree  2=Disagree  3=Neutral  4=Agree  5=Strongly Agree)

a. I was experienced performing a left-sided laparoscopic nephrectomy

b. I was experienced performing a right-sided laparoscopic nephrectomy

13. Please answer how much you agree with the following statement during the years 2009-2014:

(1=Strongly Disagree  2=Disagree  3=Neutral  4=Agree  5=Strongly Agree)

a. I was experienced performing an Open living donor nephrectomy

b. I was experienced performing a Pure Straight Laparoscopic living donor nephrectomy

c. I was experienced performing a Hand Assisted Laparoscopic living donor nephrectomy

d. I was experienced performing a Retroperitoneoscopic living donor nephrectomy

14. The following questions are based on your experience during the years 2009-2014

a. Did you routinely use pre-operative antibiotics?

b. Did you routinely use intravenous heparin prior to cross clamping?

c. Did you routinely use subcutaneous heparin for DVT/PE prophylaxis?

Kind Regards,

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SDC, References
1. Rosenthal R, Hoffmann H, Clavien PA, Bucher HC, Dell-Kuster S. Definition and classification of intraoperative complications (classic): Delphi study and pilot evaluation. *World J Surg*. 2015;39(7):1663-1671.

2. Dindo D, Demartines N, Clavien P-A. Classification of Surgical Complications. *Ann Surg*. 2004;240(2):205-213.

3. Dindo D, Clavien P-A. What Is a Surgical Complication? *World J Surg*. 2008;32(6):939-941.

4. Levey AS, Stevens LA, Schmid CH, et al. A new equation to estimate glomerular filtration rate. *Ann Intern Med*. 2009;150(9):604-612.

5. Chobanian A V, Bakris GL, Black HR, et al. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42(6):1206-1252.

6. Mengden T, Chamontin B, Phong Chau N, Luis Palma Gamiz J, Chanudet X. User procedure for self-measurement of blood pressure. First International Consensus Conference on Self Blood Pressure Measurement. *Blood Press Monit*. 2000;5(2):111-129.

7. Baguet J-P, Mallion J-M. Self-monitoring of blood pressure should be used in clinical trials. *Blood Press Monit*. 2002;7(1):55-59.