higher risk of complications, and conversion to an open operation as a consequence of technical problems during the initial 30 cases.[46] It has been suggested that the progression of inexperienced individual surgeons through the learning curve in institutions performing laparoscopic nephrectomy may obscure the real effect of the learning curve.[47]

SUMMARY OF THE EVIDENCE

When performed in experienced high-volume transplant centres, equivalent outcomes (donor and recipient) occur with open living donor nephrectomy and laparoscopic donor nephrectomy performed by surgeons with significant previous laparoscopic experience.

Major complications and donor mortality occur infrequently and limit the feasibility of randomized controlled trials in comparing these occasional but extremely important events. Use of multi-institutional registry data is potentially the only means of resolving these safety issues. Compulsory prospective contribution to an independent central database will guarantee accurate reporting and ensure that important events that may influence conclusions are not excluded.

Laparoscopic donor nephrectomy is associated with reduced analgesic requirements and more rapid return to normal activities compared with open surgery. Longer operative times and institutional costs occur, which are only partly offset by reduced loss of income by the donor in terms of overall costs to the community.

WHAT DO THE OTHER GUIDELINES SAY?

Kidney Disease Outcomes Quality Initiative: No recommendation.
UK Renal Association: No recommendation.
British Transplant Society: No recommendation.
Canadian Society of Nephrology: No recommendation.
European Best Practice Guidelines: No recommendation.
Amsterdam Forum: Care of the live kidney donor
There are no guidelines available for surgical technique in living donor nephrectomy.

In relation to DVT prophylaxis, factor v-leiden, a variant of the coagulation protein factor v, is associated with venous thrombosis, especially in oral contraceptive users. It is the most common hereditary blood coagulation disorder and is present in 3–8% of the healthy white population. Factor v-leiden mutant genes have been detected in 2% of living donors. The odds ratio of a venous thrombo-embolic event is 11 times greater in women taking oral contraceptives who have factor v-leiden mutation than those who do not. It is recommended that a history of venous thromboembolism be ascertained prior to an in-depth coagulation work-up. Unless the medical history reveals a medical concern that would necessitate a comprehensive coagulation profile, tests are considered not likely to yield information. Such tests include PT, PTT, antithrombin 3, protein S, Protein C, Activated protein C resistance (APC), PT- Prothrombin mutation, cardiolipin antibodies and lupus anticoagulants. It is recommended that oral contraceptives and hormone replacement therapy be withheld for 3 months prior to donation.

SUGGESTIONS FOR FUTURE RESEARCH

Transplant units performing live donor nephrectomy should be required to submit prospective audit data to a centralized, independently-maintained registry as the most feasible means of identifying differences in major outcome measures of donor safety.

CONFLICT OF INTEREST

Norma Gibbons and David Nicol have no relevant financial affiliations that would cause a conflict of interest according to the conflict of interest statement set down by CARI.

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APPENDICES

Table 1 Characteristics of included studies

Study ID (author, year)	*n*	Study design	Setting	Participants	Intervention (experimental group)	Intervention (control group)	Follow up (months)
Anderson *et al.* 2006[25]	122	Randomized controlled clinical trial	University hospital, Norway	122 living kidney donors	Laparoscopic nephrectomy	Open nephrectomy	1 month
Kok *et al.* 2006[23]	100	Randomized controlled clinical trial	University hospitals, Netherlands	100 living kidney donors	Laparoscopic nephrectomy	Open nephrectomy	12 months
Oyen *et al.* 2005[21]	122	Randomized controlled clinical trial	University hospital, Norway	122 living kidney donors	Laparoscopic nephrectomy	Open nephrectomy	<3 months
Simforoosh *et al.* 2005[24]	200	Randomized controlled clinical trial	University hospital, Iran	200 living kidney donors	Laparoscopic nephrectomy	Open nephrectomy	12 months
Simforoosh *et al.* 2003[22]	80	Randomized controlled clinical trial	University hospital, Iran	80 living kidney donors	Laparoscopic nephrectomy	Open nephrectomy	10 months
Wolf *et al.* 2001[19]	70	Randomized controlled clinical trial	Single centre, USA	70 living kidney donors	Laparoscopic nephrectomy	Open nephrectomy	12 months

Table 2 Quality of randomized trials

Study ID (author, year)	Method of allocation concealment†	Blinding			Intention-to-treat analysis‡	Loss to follow up (%)
		(participants)	(investigators)	(outcome assessors)		
Anderson *et al.* 2006[25]	Block randomization	No	No	No	Yes	1.6
Kok *et al.* 2006[23]	Sequentially labelled opaque sealed envelopes	No	Yes	No	No	15.2
Oyen *et al.* 2005[21]	Not specified	No	No	No	Yes	0.0
Simforoosh *et al.* 2005[24]	Not specified	No	No	No	Unclear	0.0
Simforoosh *et al.* 2003[22]	Not specified	No	No	No	Unclear	0.0
Wolf *et al.* 2001[19]	Sequentially labelled opaque sealed envelopes	No	No	No	No	44.0

†Choose between: central; third party (e.g. pharmacy); sequentially labelled opaque sealed envelopes; alternation; not specified.
‡Choose between: yes; no; unclear.

Table 3 Results for dichotomous outcomes

Study ID (author, year)	Outcomes	Intervention group (number of patients with events/number of patients exposed)	Control group (number of patients with events/number of patients not exposed)	Relative risk (RR) (95% CI)	Risk difference (RD) (95% CI)
Anderson *et al.* 2006[25]	Mortality	0/63	0/59	Not estimable	0.00 (95% CI: 0.03, 0.03)
	No pain	40/63	24/59	1.56 (95% CI: 1.09, 2.24)	0.23 (95% CI: 0.06, 0.401)
Kok *et al.* 2006[23]	Mortality	2/50	1/50	2.00 (95% CI: 0.19, 21.36)	0.02 (95% CI: 0.05, 0.09)
	Renal vein thrombosis	0/50	0/50	Not estimable	0.00 (95% CI: 0.04, 0.04)
	Acute rejection	9/50	15/50	0.60 (95% CI: 0.29, 1.24)	–0.12 (95% CI: 0.29, 0.05)
	Ureteral complications	6/50	10/50	0.60 (95% CI: 0.24, 1.53)	–0.08 (95% CI: 0.22, 0.06)
	Graft survival at 1 year	48/50	48/50	0.98 (95% CI: 0.91, 1.05)	–0.02 (95% CI: 0.09, 0.05)
Oyen *et al.* 2005[21]	Perioperative incidents	4/63	1/59	3.75 (95% CI: 0.43, 32.56)	0.05 (95% CI: 0.02, 0.12)
	Reoperations	5/63	0/59	10.31 (95% CI: 0.58, 182.53)	0.08 (95% CI: 0.01, 0.15)
	Other/late complications	5/63	3/59	1.56 (95% CI: 0.39, 6.25)	0.03 (95% CI: 0.06, 0.12)
Simforoosh *et al.* 2005[24]	Discharged within 48 h of surgery	83/100	85/100	0.98 (95% CI: 0.87, 1.10)	–0.02 (95% CI: 0.12, 0.08)
	Intraoperative complications	4/100	18/100	0.22 (95% CI: 0.08, 0.63)	–0.14 (95% CI: 0.22, –0.06)
	Postoperative complications	19/100	9/100	2.11 (95% CI: 0.08, 0.63)	0.10 (95% CI: 0.00, 0.20)
Simforoosh *et al.* 2003[22]	Reoperation	1/40	0/40	3.00 (95% CI: 0.13, 71.51)	0.03 (95% CI: 0.04, 0.09)
	Pneumothorax	0/40	4/40	0.11 (95% CI: 0.01, 2.00)	–0.10 (95% CI: 0.20, 0.00)
	Bleeding	1/40	0/40	3.00 (95% CI: 0.13, 71.51)	0.03 (95% CI: 0.04, 0.09)
	Retention	1/40	0/40	3.00 (95% CI: 0.13, 71.51)	0.03 (95% CI: 0.04, 0.09)
	Ileus	1/40	2/40	0.50 (95% CI: 0.05, 5.30)	–0.03 (95% CI: 0.11, 0.06)
	UTI	1/40	0/40	3.00 95% CI: 0.13, 71.51)	0.03 (95% CI: 0.04, 0.09)
	Scrotal swelling	1/40	0/40	3.00 (95% CI: 0.13, 71.51)	0.03 (95% CI: 0.04, 0.09)
	Small spleen injuries	2/40	0/40	5.00 (95% CI: 0.25, 100.97)	0.05 (95% CI: 0.03, 0.13)
Wolf *et al.* 2001[19]	Minor postoperative complications	4/23	4/27	1.17 (95% CI: 0.33, 4.18)	0.03 (95% CI: 0.18, 0.23)

UTI, urinary tract infection.

Table 4 Summary of randomized controlled trials comparing open laparoscopic donor nephrectomy

Study	Case no.	Mean donor age (years)	Kidney R/L	Mean operation time (min)	Mean WIT (min)	Vascular control	Kidney retrieval	Conversion	Mortality	Mean hospital stay (days)	Creatinine day 3 mmol/L	Creatinine 3 months
1. Simforoosh *et al.* 2003[22]												
Laparoscopic	40	27.3	All left	251.4	6.6	Metal clips	Transperitoneal Pfannensteil Hand	1	0	2.21	1.91	1.32
Open	40	29.2	All left	135	2.09	Metal clips	Retroperitoneal flank		0	2.13	1.46	1.37
2. Simforoosh *et al.* 2005[24]												
Laparoscopic	100	27.8	All left	270.8	8.7	Metal clips	Transperitoneal Pfannensteil Hand	0	0	2.26	2.01	1.47
Open	100	29.2	All left	152.2	1.87	Metal clips	Retroperitoneal		0	2.2	1.85	1.41
3. Oyen *et al.* 2005[21]												
Laparoscopic	63	46	All left	180	4.3	Metal clips Endovascular stapler	Transperitoneal Midline Hand port	1	0	6.2	–	–
Open	59	45	All left	140	1.4	Metal clip Endovascular stapler	Retroperitoneal		0	6.7	–	–
4. Wolf *et al.* 2001[19]												
Laparoscopic	23	38	All left	206	3.3	Endoscopic staple device	Transperitoneal Midline Pneumosleeve	0	0	1.7	1.7	1.2
Open	27	41	All left	125	1.36	–	Retroperitoneal Flank		0	2.6	2.1	1.5
5. Kok *et al.* 2006[23]												
Laparoscopic	50	49	L- 30 R-20	289	6	Endovascular stapler	Transperitoneal Pfannensteil	0	0	3	1.18	1.07
Open	50	48.5	L-31 R-19	226	3	–	Retroperitoneal flank			3	1.17	1.17
6. Andersen *et al.* 2006[25]												
Laparoscopic	63	46	All left	180	NA	NA	Transperitoneal Infrumbilical/ midline Basket/hand	0	0	6.2	NA	NA
Open	59	45	All left	140	NA	NA	Retroperitoneal		0	6.7	NA	NA

WIT, warm ischemia time.