



## UPPER TRACT SURGERY REVIEW

# Laparoscopic and hand-assisted laparoscopic donor nephrectomy: A systematic review and meta-analysis

Mark P. Broe<sup>a,\*</sup>, Rose Galvin<sup>b</sup>, Lorna G. Keenan<sup>a</sup>, Richard E. Power<sup>a</sup>

<sup>a</sup> Department of Urology and Renal Transplantation, Beaumont Hospital, Dublin, Ireland

<sup>b</sup> Department of Postgraduate Studies, Royal College of Surgeons in Ireland, Dublin, Ireland

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### KEYWORDS

Laparoscopic donor nephrectomy;  
Hand-assisted donor nephrectomy;  
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### ABBREVIATIONS

BMI, body mass index;  
(L)DN, (laparoscopic) donor nephrectomy;  
EBL, estimated blood loss;  
FEM, fixed-effects model;  
HALDN, hand-assisted laparoscopic donor nephrectomy;  
HARPDN, hand-

**Abstract Objective:** To compare the perioperative outcomes of hand-assisted laparoscopic donor nephrectomy (HALDN) and pure LDN, as HALDN and LDN are the two most widely used techniques of DN to treat end-stage renal disease.

**Methods:** In this systematic review and meta-analysis, we performed a literature search of PubMed, Embase, Web of Science, and Cochrane from 01/01/1995 to 31/12/2014. The primary outcome was conversion to an open procedure. Secondary outcomes were warm ischaemia time (WIT), operation time (OT), estimated blood loss (EBL), complications, and length of stay (LOS). Data analysed were presented as odds ratios (ORs) or weighted mean differences (WMDs) with 95% confidence intervals (CIs),  $I^2$ , and  $P$  values. Subgroup analysis was performed.

**Results:** There were 24 studies included in the meta-analysis; three randomised controlled trials (RCTs), one randomised pilot study, two prospective, and 18 retrospective cohort studies. There were no differences in conversion to an open procedure between the two techniques for both RCTs (OR 0.42, 95% CI 0.06, 2.90;  $I^2 = 0\%$ ,  $P < 0.001$ ) and cohort studies (OR 1.06, 95% CI 0.63, 1.78;  $I^2 = 0\%$ ,  $P = 0.84$ ). WIT was shorter for the HALDN ( $-41.79$  s, 95% CI  $-71.85$ ,

\* Corresponding author at: Registrar in Urology, Beaumont Hospital, Dublin 9, Ireland.

E-mail address: [markbroe@rcsi.ie](mailto:markbroe@rcsi.ie) (M.P. Broe).

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assisted retroperitoneal donor nephrectomy; LOS, length of stay; OR, odds ratio; OT, operation time; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-analyses; RALDN, robot-assisted laparoscopic donor nephrectomy; RCT, randomised controlled trial; REM, random-effects model; WIT, warm ischaemia time; WMD, weighted mean difference

–11.74;  $I^2 = 96\%$ ,  $P = 0.006$ ), as was the OT (–26.32 min, 95% CI –40.67, –11.97;  $I^2 = 95\%$ ,  $P < 0.001$ ). There was no statistically significant difference in EBL, complications or LOS.

**Conclusion:** There is little statistical evidence to recommend one technique. HALDN is associated with a shorter WIT and OT. LDN has equal safety to HALDN. Further studies are required.

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## Introduction

Renal transplantation improves both the quantity and quality of life for recipients [1]. Worldwide >40% of the ~69 000 kidney transplants carried out in 2008 were from live donors [2]. Live-donor nephrectomies (DNs) are more cost effective [3] and offer superior graft survival particularly in the longer term [4,5]. When carefully screened, healthy kidney donors have been shown to have no increased risk of developing end-stage renal disease than the average population [6].

Laparoscopic DN (LDN) was introduced in 1995 by Ratner et al. [7], with lower postoperative pain, quicker recovery time, shorter hospital stay, and better cosmesis [8]. LDN has become the reference standard for DN for these reasons and has been shown to increase recruitment of live donors [9,10]. However, some of the earlier studies raised questions over the safety of the procedure due to intraoperative events, so hand-assisted LDN (HALDN) was introduced in 1998 as an alternative technique [11]. This enabled a combination of the minimally invasive approach with tactile feedback and immediate control of the hilum should intraoperative bleeding occur. The learning curve associated with HALDN was another advantage over LDN [12].

Both LDN and HALDN techniques have been shown to have advantages over the open procedure [13–15]. However, the superiority of one technique over another is still not entirely clear when it comes to technical variations in LDN. Similarly, for the hand-assisted technique there have been few studies directly comparing the transperitoneal and retroperitoneal approaches and no randomised controlled trial (RCT) in this area.

In 2007, a systematic review and meta-analysis of nine studies comparing 174 LDN and 202 HALDN procedures found that HALDN had a lower rate of conversion to an open procedure (2.97% vs 4.6%), a shorter warm ischaemia time (WIT) and length of procedure, as well as lower blood loss than LDN [16]. According to another review, HALDN trended towards a lower intraoperative complication rate and increased minor postoperative complications than LDN [17]. A qualitative review of evidence in 2010 found that most studies comparing different minimal invasive techniques were similar in terms of intra- and postoperative outcome for both the donor and the recipient [15]. Wadstrom et al. [18] carried out a systematic review and meta-analysis comparing traditional open DN to pure LDN and HALDN methods in 2011. This covered 30 original articles relating to DN but also included 21 articles concerning radical nephrectomy and 14 nephroureterectomy.

Since 2007 there has been at least nine further studies comparing LDN to HALDN or hand-assisted retroperitoneal DN (HARPDN), including three RCTs. Therefore, an updated analysis of the outcomes for these procedures is warranted.

## Methods

### Study design

A systematic review of RCTs, as well as prospective and retrospective cohort studies, was carried out using the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist [19].

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