

Randomized Clinical Trial of Posterior Retroperitoneoscopic Adrenalectomy Versus Lateral Transperitoneal Laparoscopic Adrenalectomy With a 5-Year Follow-up

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Objective: To test if posterior retroperitoneoscopic adrenalectomy (PRA) is superior to lateral transperitoneal laparoscopic adrenalectomy (LTLA).

Background: Most popular LTLA has been recently challenged by an increasing popularity of PRA, which is believed by many surgeons (not evidence-based) as superior to LTLA in the treatment of small and benign adrenal tumors.

Methods: Participants were assigned randomly to PRA or LTLA and followed for 5 years after surgery. The primary endpoint was the duration of surgery. Secondary endpoints were blood loss, conversion rate, postoperative recovery, morbidity, and costs.

Results: Sixty-five patients were included, of whom 61 (PRA 30, LTLA 31) completed the 5-year follow-up. The following differences were identified in favor of PRA vs LTLA: shorter duration of surgery (50.8 vs 77.3 minutes), lower intraoperative blood loss (52.7 vs 97.8 mL), diminished pain intensity within 48 hours postoperatively, lower prevalence of shoulder-tip pain (3.0% vs 37.5%), shorter time to oral intake (4.4 vs 7.3 hours), shorter time to ambulation (6.1 vs 11.5 hours), shorter length of hospital stay, and lower cost (1728 € vs 2315 €), respectively ($P < 0.001$ for all). No differences were noted in conversion rate or morbidity except for herniation occurring more often after LTLA than PRA (16.1% vs 0%, $P = 0.022$) and need for hernia repair (12.9% vs 0%, $P = 0.050$), respectively.

Conclusions: Both approaches were equally safe. However, outcomes of PRA operations were superior to LTLA in terms of shorter surgery duration, lower blood loss, lower postoperative pain, faster recovery, improved cost-effectiveness, and abolished risk of surgical access site herniation. Registration number: NCT01959711 (<http://www.clinicaltrials.gov>).

Keywords: lateral transperitoneal laparoscopic adrenalectomy, minimally invasive adrenal surgery, posterior retroperitoneoscopic adrenalectomy

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First descriptions of laparoscopic adrenalectomy were published in 1992 independently by Higashihara et al¹ and Gagner et al.² Subsequently, numerous studies have shown the safety and feasibility of this technique and laparoscopic adrenalectomy has become the gold standard operation for benign and small- to medium-sized adrenal tumors.^{3–8} The most frequently performed technique worldwide is the lateral transperitoneal laparoscopic adrenalectomy (LTLA), with the patient in the lateral decubitus position.^{4,9} Other techniques include the anterior transperitoneal technique,¹⁰ lateral retroperitoneoscopic

adrenalectomy (LRA),¹¹ or an increasingly more popular posterior retroperitoneoscopic adrenalectomy (PRA), first described by Merican, but advanced and popularized by Walz.^{12–21} Advocates of each technique claim its superiority, but this issue has yet to be resolved according to the evidence-based criteria.²² Indeed, most published studies in the field are observational, with only few exceptions.^{6,23,24} Of the 3 recently published meta-analyses, 2 concluded that laparoscopic adrenalectomy has equivalent outcomes to the retroperitoneal approach,^{22,25} whereas one clearly indicated the latter technique as superior in short-term outcomes.²⁶ However, extended follow-ups and further randomized controlled trials (RCTs) are required to perform the analysis.²⁶ The aim of this study was to evaluate the results of PRA versus LTLA in patients with unilateral benign adrenal tumors up to 7 cm in diameter. It was hypothesized that PRA may be superior to LTLA for both short-term and long-term outcomes.

METHODS

Trial Design and Participants

Patients referred to the Third Department of General Surgery, Jagiellonian University Medical College, Krakow, between January 2006 and June 2008 for first time adrenal surgery were registered. Eligible patients with adrenal tumors were assessed for the study. The study was approved by the institutional review board.

The inclusion criterion was planned unilateral adrenal surgery for a benign tumor up to 7 cm in diameter. Exclusion criteria were diffuse peritonitis in history, major abdominal surgery in history, planned bilateral adrenal surgery, adrenal tumor more than 7 cm in diameter, suspected adrenocortical cancer, metastasis to adrenal gland, previous adrenal surgery, pregnancy or lactation, age less than 18 or more than 80 years, American Society of Anesthesiologists fitness grade IV, and inability to comply with the follow-up protocol.

The patients were randomized to one of the parallel groups: PRA or LTLA. The patients, nurses, and clinical investigators assessing outcomes in this study were blinded to the relevant group assignment.

Perioperative Workup

In all the patients, adrenal tumor was confirmed preoperatively by abdominal spiral computed tomography (CT) and hormonal activity was assessed in keeping with the current standards (urinary metoxycatecholamines, diurnal cortisol, dexamethasone suppression test, ACTH, DHEAS, blood ions, as well as serum aldosterone concentration and serum renin activity). Indications for unilateral adrenalectomy in this study were hormonally active adrenal tumors up to 7 cm in diameter, and nonfunctioning adrenal tumors, either if their diameter was between 4 and 7 cm, or in smaller tumors, if the lesion was progressively enlarging on follow-up CT scans (>1 cm enlargement within 6 months). Larger tumors were also qualified for surgery, but were operated on outside this study, either by LTLA or via an open approach. Pheochromocytoma patients underwent a high-dose alpha-adrenergic blockade (phenoxybenzamine 2–4 mg/kg body weight per os) preoperatively. Patients with

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