



Current status of laparoscopic adrenalectomy and future directions

Robert P. Sutcliffe

University Hospitals Birmingham, Birmingham, UK

Correspondence to: Robert P. Sutcliffe, MD, FRCS. Liver Unit, Third Floor Nuffield House, Queen Elizabeth Hospital, Birmingham B15 2TE, UK.

Email: robert.sutcliffe@uhb.nhs.uk.

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The technique of laparoscopic adrenalectomy has been standardised over recent decades and is now favoured over open surgery for most indications, due to the established short-term benefits associated with laparoscopic surgery. The aim of this series, which is focussed on laparoscopic adrenalectomy, was to elaborate on the technical aspects of adrenalectomy, and to explore more controversial topics, such as the roles of laparoscopic adrenalectomy for large adrenal tumours and partial adrenalectomy. Key issues of patient selection, preoperative work-up and operative technique for both transperitoneal and retroperitoneal laparoscopic adrenalectomy have been elegantly summarised in two articles by Stechman and McCoy *et al.* (1,2). The retroperitoneal approach is less widely adopted but appears to have an acceptable learning curve when undertaken by experienced laparoscopic surgeons, and may have advantages over a transperitoneal approach, particularly for small or bilateral lesions. The importance of mentorship on reducing the learning curve for retroperitoneal adrenalectomy has been emphasised in the article by van Uitert *et al.* (3). Although a transperitoneal approach may be more familiar to laparoscopic surgeons, the impact of surgeon experience and volume on postoperative outcomes after transperitoneal adrenalectomy has also been highlighted by Stechman.

With increasing experience, surgeons invariably test the limits of what may be achievable laparoscopically, and the systematic review by Varghese *et al.* (4) evaluated the feasibility of laparoscopic adrenalectomy for large tumours. In the absence of any high-quality prospective data, they found that a laparoscopic approach was feasible for large tumours (over 6 cm), although tumour size was

associated with an increased risk of conversion to open surgery, particularly for phaeochromocytoma. The authors have highlighted the importance of surgeon experience in selecting patients with large tumours for a laparoscopic approach and have advised caution in patients with suspected adrenal cancer. Maintaining oncological principles of achieving an R0 resection without capsular breach is essential and should be prioritised over any potential short-term advantages of laparoscopic surgery. In experienced hands, however, a laparoscopic approach may be considered for selected patients with adrenal cancer, providing that the quality of the oncological resection can be preserved, with a low threshold for conversion to open surgery, especially in the presence of adjacent organ involvement.

On the other end of the spectrum, adrenalectomy is frequently performed for patients with small, benign lesions, which are ideally suited for a laparoscopic approach. A subset of these patients is susceptible to developing bilateral lesions, and there has been a growing interest in the role of partial (or cortical-sparing) adrenalectomy to preserve adrenal function in these patients in order to prevent or delay the onset of adrenal insufficiency that would follow bilateral adrenalectomy. Onuma *et al.* (5) have undertaken a comprehensive review of the literature on the topic of partial adrenalectomy, including a detailed description of the technical aspects of the procedure. They have also introduced the topic of intraoperative near-infrared imaging after systemic injection of indocyanine green as a potentially useful adjunct during surgery, and merits further study.

It is clear that patient recovery is faster after laparoscopic adrenalectomy, and this is reflected by shorter hospitalization

compared to open surgery. Day-case (or outpatient) surgery is a natural progression and has proven to be safe and cost-effective for common procedures such as laparoscopic cholecystectomy. Michelakos *et al.* (6) performed a scoping review on the topic of outpatient minimally invasive adrenalectomy and found that hospital discharge within 24 hours after surgery was feasible after both transperitoneal and retroperitoneal approaches, and that outpatient adrenalectomy could potentially be applied to a wide spectrum of patients, with the possible exception of pheochromocytoma. They identified several factors that were associated with failure to discharge patients within 24 hours, such as American Society of Anesthesiologists (ASA) class and body mass index. However, they noted that outpatient adrenalectomy is not widely practised at present and in the absence of prospective studies, it is not possible to clearly define the target group who are most likely to benefit from this approach.

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