

Paper

Laparoscopic adrenalectomy versus open adrenalectomy: results from a retrospective comparative study

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SUMMARY

The relatively new operation of laparoscopic adrenalectomy has now become the procedure of choice for the management of most benign adrenal tumours. We have reviewed the data relating to the first 25 patients on whom we performed laparoscopic adrenalectomy and have made comparison with a group of 25 diagnosis-matched individuals on whom we had previously carried out open adrenalectomy.

The patients who underwent laparoscopic adrenalectomy had a significantly shorter hospital stay and experienced significantly less postoperative morbidity than those who had an open operation, but the operation time was significantly longer for the laparoscopic group of patients. There is now good potential and sound evidence base for extending the indications for laparoscopic adrenalectomy.

INTRODUCTION

The technique of laparoscopic adrenalectomy was first described in 1992.¹ Subsequently, the operation has been performed with increasing frequency in specialist endocrine surgical units and has now become the treatment of choice for most benign adrenal tumours.

Recent studies have demonstrated significant benefits for patients who have undergone laparoscopic adrenalectomy, in terms of reduced operative morbidity, shorter hospital stay and earlier return to normal activity when compared to those submitted to open operation.²⁻⁴

In the Endocrine Surgery unit in the Royal Victoria Hospital we began to carry out laparoscopic adrenalectomy in 1998. This paper records our early experience of this innovative procedure and makes comparison with historical data relating to open adrenalectomy.

PATIENTS AND METHODS

The first 25 patients who underwent laparoscopic adrenalectomy in our unit, were compared retrospectively with the most recent diagnosis matched group of 25 individuals who had previously undergone open adrenalectomy. All operations in both groups of patients were carried out by one of two consultant endocrine surgeons, working as a team, under general anaesthetic with full muscle relaxation and mechanical ventilation.

The laparoscopic operation was performed in all instances using a transperitoneal approach with the patient placed in an almost full lateral position, and with the operating table "broken" to maximum extension to allow the space between

rib cage and pelvis to open fully. Three ports were employed for left adrenalectomy and an additional port utilised on the right side to allow retraction of the liver. Pneumoperitoneum was established using an open technique and a 30-degree laparoscope used in all cases.

On the left side the spleno-colic ligament is freed to allow protection of the splenic flexure of the colon. The lieno-renal ligament is then divided to allow spleen and distal pancreas to fall forward, permitting exposure of the adrenal gland. On the right side, after retracting the liver, the posterior peritoneum is incised widely to allow access to the adrenal gland, right kidney and inferior vena cava. Securing the single, substantial adrenal vein on each side represents a critical part of the operation. On the left side the adrenal vein almost always drains vertically downwards into the left renal vein while, on the right side, the vein invariably passes transversely or obliquely directly into the vena cava. In all patients in both groups the adrenal vein was secured using individual vascular clips. Once the adrenal vein has been secured and divided, the adrenal gland is freed from its various attachments and delivered using a retrieval bag. We have routinely performed total adrenalectomy and have not attempted subtotal resection for any pathology.

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In the open operation, the adrenal gland was approached on either side using a postero-lateral incision through the bed of the 11th rib and with resection of the rib. The retroperitoneum was then opened and the adrenal gland exposed.

The clinical records of all 50 patients were reviewed. Demographic details, body mass index (BMI), American Society of Anaesthesiologists (ASA) classification, length of operation, postoperative complications and length of hospital stay were recorded. Demographic details were analysed using the chi squared test and comparison made between laparoscopic and open groups using an unpaired t test. All statistical analyses were performed using SPSS software (version 10, SPSS Inc., Chicago). Values are reported as mean \pm SEM and a probability value of <0.05 considered significant.

Results

Fifty patients were included in the study; twenty-five having undergone laparoscopic adrenalectomy and 25 open adrenalectomy. There were no significant differences between the demographic details of the two patient groups (Table I) nor the indications for operation (Table II). Four individuals, two from each group, underwent bilateral total adrenalectomy. In one patient undergoing laparoscopic left adrenalectomy for Cushing's syndrome, conversion to open operation was required as the adrenal vein could not be clearly identified. These five patients were excluded from further analysis leaving 22 patients in the laparoscopic group and 23 in the open group.

TABLE I

Demographic details

	Open (n = 25)	Laparoscopic (n = 25)	P value
Age (years)	47.50 \pm 2.17	46.79 \pm 2.99	0.96 (ns)
Sex (male : female)	8:17	9:16	0.76 (ns)
BMI	28.07 \pm 0.65	29.92 \pm 1.17	0.15 (ns)
ASA	2.06 \pm 0.13	2.20 \pm 0.08	0.38 (ns)

BMI = Body Mass Index

ASA = American Society of Anaesthesiology

TABLE II

Indications for operation

	Open (n = 25)	Laparoscopic (n = 25)
Conn's Syndrome	14	13
Cushing's Syndrome	6 (2 bilateral)	5 (1 bilateral)
Androgen producing tumour	0	1
Bilateral congenital Adrenocortical hyperplasia	0	1
Pheochromocytoma	4	4
Non functioning tumour (Cortical adenoma)	1	1

TABLE III

Perioperative data

	Open (n = 23)	Laparoscopic (n = 22)	P value
Transfusion requirement (units)	0.15	0	0.32 (ns)
Maximum diameter of tumour/gland (cm)	2.41 \pm 0.40	3.26 \pm 0.56	0.23 (ns)
Weight of tumour/gland (g)	20.09 \pm 3.71	25.80 \pm 5.43	0.39 (ns)

There was no significant difference between the two groups of patients studied in terms of perioperative blood transfusion requirement, tumour size or tumour weight (Table III). However, the mean operating time for individuals who had the laparoscopic procedure performed was significantly longer than that for those who underwent open adrenalectomy (199.7 \pm 14.3 minutes versus 143.7 \pm 5.9 minutes; $p = 0.001$). In contradistinction, the mean duration of postoperative hospital stay for patients undergoing laparoscopic adrenalectomy was significantly shorter (3.95 \pm 0.32 days versus 10.16 \pm 0.83 days; $p < 0.001$).

Significantly fewer postoperative complications were encountered in the laparoscopic group than in the open group (3v9; $p = 0.04$) although no major problems were experienced in either patient group following operation (Table IV). There was no operative mortality.

TABLE IV

Postoperative Complications

	Open (n = 23)	Laparoscopic (n = 22)
Chest Infection	5	2
Pneumothorax	2	0
Wound Infection	2	0
Atrial Fibrillation	0	1

DISCUSSION

Because of their anatomy, the adrenal glands are, in surgical terms, relatively inaccessible. For that reason a variety of surgical approaches have been employed over the years when open operation on the glands has been practised. These include the anterior, transperitoneal approach using a subcostal incision, the posterior, retroperitoneal approach with the patient fully prone and the postero-lateral approach through the bed of the 11th or 12th rib, again utilising an exclusively extraperitoneal route to the adrenal glands. All of these procedures represent major surgery through large incisions and are associated with significant pain and postoperative morbidity. Against this background, laparoscopic adrenalectomy represents an attractive option for both patient and surgeon with its reduced invasiveness

but without compromise of the ability to visualise and resect the adrenal glands.

This retrospective comparative study has confirmed the findings of others that patients undergoing laparoscopic adrenalectomy require to stay in hospital for very significantly shorter periods of time following operation when compared to individuals who have had open adrenalectomy performed. Patients having the laparoscopic procedure also developed fewer postoperative complications than those submitted to open operation. Although data are not available for our two groups of patients, we have little doubt that postoperative analgesic requirement following laparoscopic adrenalectomy is markedly reduced in comparison to the requirement after open surgery.

The prolonged operation times recorded for our patients who underwent laparoscopic adrenal resection when compared to those who had an open operation are in keeping with the experience of others⁵ and undoubtedly reflects, at least to some degree, our learning curve for this technically demanding procedure. Hopefully, the operating times for laparoscopic adrenalectomy will shorten as our experience with the operation continues to grow.

In common with colleagues elsewhere we initially restricted the offer of laparoscopic adrenalectomy to those patients with small tumours, notably individuals suffering from primary hyperaldosteronism (Conn's syndrome) or hypercortisolism (Cushing's syndrome), both of which are typically caused by small, unilateral adrenocortical adenomas. Subsequently however, we have cautiously extended our indications for laparoscopic adrenalectomy to include adrenal medullary tumours (pheochromocytoma) and larger tumours when there has been no preoperative radiological evidence of malignancy. In this regard, careful scrutiny of CT or MRI scans in patients with large tumours in order to ensure that there is no clear evidence of invasion of adjacent structures by the tumour, is critical in terms of patient selection for the laparoscopic operation. Recent evidence confirms that with careful patient assessment and selection, laparoscopic adrenalectomy can be performed safely even when the tumour is large.⁶ However, ongoing and longer term review of such patients is essential in order to ensure that the potential for permanent cure has not been compromised.

To date, all of our laparoscopic procedures have been performed via the transperitoneal route. Recently Walz and colleagues have drawn attention to the possibility and the attraction of performing laparoscopic adrenalectomy using a retroperitoneal approach.⁷ Currently, we have no experience of this interesting procedure but continue to keep an open mind on its potential benefits.

Finally, it is important to underline the fact that, from time to time, it becomes necessary to convert the anticipated laparoscopic procedure to open operation. It is therefore essential that those surgeons carrying out laparoscopic adrenalectomy are also adequately trained in and comfortable with performing open resection of the adrenal glands.

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The authors have no conflict of interest