

# Retrospective Review of Laparoscopic Adrenalectomy: An Experience at King Fahad Medical City, Riyadh

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## ABSTRACT

**Background:** Laparoscopic adrenalectomy is considered the standard surgical approach for adrenal tumors and is replacing the open technique in the majority of centers. The aim of the present study was to review the authors experience with laparoscopic adrenalectomy.

**Materials and methods:** A retrospective review of laparoscopic adrenalectomies performed by an endocrine surgeon over a period of 4 years at King Fahad Medical City was conducted perioperative and postoperative records were studied.

**Results:** Total of 10 patients underwent laparoscopic adrenalectomy. Mean operative time was 3 hours and 30 minutes; length of hospital stay was significantly low. Complications were few, with one patient developing a port site hernia.

**Conclusion:** Laparoscopic adrenalectomy can be performed safely and has the advantages of minimally invasive surgery. With experience the technical aspects show marked improvement as there is a learning curve.

**Keywords:** Adrenal tumors, Adrenalectomy, Laparoscopy.

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## INTRODUCTION

Adrenal tumors represent a wide spectrum of pathologies ranging from benign adenoma to adrenocortical carcinoma. Indications for adrenalectomy include hormone secretion and/or perceived risk of malignancy (i.e. tumor size, radiographic features, local invasion, lymph node involvement or distant metastasis).<sup>1-3</sup>

The introduction of laparoscopic cholecystectomy in 1988 ushered in a new surgical era.<sup>4</sup> The potential benefits of minimally invasive operations include shorter hospital stay, minimal morbidity, rapid postoperative recovery and an early return to preoperative activities.<sup>5</sup>

The surgical approach to the adrenal gland requires a large flank incision leading to increased morbidity. Adrenal surgery was revolutionized by the introduction of laparoscopy.<sup>6</sup>

The adrenal glands are ideal for a laparoscopic approach as they are small and have a low incidence of malignancy.<sup>7-9</sup> Laparoscopic adrenalectomy has become the standard technique for the surgical removal of the adrenal glands at many centers worldwide.<sup>10</sup>

The present study was undertaken with the objective of assessing the effectiveness of laparoscopic adrenalectomy in terms of operative time, complications and length of hospital stay.

## MATERIALS AND METHODS

The present study was conducted at King Fahad Medical City, Riyadh over a period of 4 years from June 2008 till June 2012.

A retrospective review was made and included 10 patients who underwent complete transperitoneal laparoscopic unilateral adrenalectomy. A formal approval was taken from the Ethical Review Board.

The following data was analyzed: age and gender; tumor characteristics like site, size, functional status, operative time and blood loss, complications, pathology and length of hospital stay.

## Operative Technique

The laparoscopic adrenalectomy was performed by transperitoneal approach. The patient is placed on the operative table in the lateral decubitus position with the table extended to facilitate exposure. In our study access to the peritoneal cavity was obtained by the open technique in the first three cases and by the closed technique using Veress needle in the rest of the cases. The abdomen is insufflated with carbon dioxide to a pressure of 15 mm Hg. A 10 to 12 mm trocar is placed into the abdominal cavity and the laparoscopic camera inserted. The underlying viscus is examined for any evidence of injury. Three additional 10 to 12 mm trocars are placed, one each in the midclavicular line approximately two finger breaths below the costal margin, in the anterior axillary line at a similar level to the camera port, and in the posterior axillary line. This posterior-most port has to be inserted after the hepatic or splenic flexure has been reflected from the abdominal wall. The approach to the right adrenal gland is performed by completely dividing the triangular ligament of the right lobe of the liver up to the suprahepatic vena cava. The peritoneum is further separated inferiorly and the liver retracted to facilitate the exposure of the inferior vena cava. The adrenal gland dissection begins from the medial margin and gradually proceeds toward the lateral margin. The adrenal vein entering the vena cava is identified early in the course of dissection and is doubly ligated with

metal clips and divided. The dissection proceeds superiorly, with the fatty tissue containing small vessels between the adrenal gland and the lateral aspect of the inferior vena cava being divided carefully. The posterior and inferior musculature of the diaphragm can be seen at this point. The dissection proceeds inferiorly until the inferior medial aspect of the gland is well identified and freed from Gerota's fascia. This is facilitated by the liberal use of clips to divide numerous small vessels in the retroperitoneal tissue. The posterior, medial, and superior aspects of the adrenal are dissected more easily from the undersurface of the diaphragm and retroperitoneal tissues. The adrenal gland is removed in an endoscopic bag through the lateral most port site. The retroperitoneal space is examined for any evidence of bleeding. This dissection is facilitated by using a 30-degree viewing laparoscope. The left adrenal gland is approached by a similar transperitoneal procedure in the lateral decubitus position, but here additionally only two more ports are placed. After the splenic flexure has been incised and the colon reflected inferiorly, the spleen is mobilized by dividing the peritoneum posterior to the spleen completely and by dividing the phrenolienal ligament. The weight of the spleen causes it to fall forward, facilitating the exposure so that the spleen does not need to be retracted by instruments. Dissection of the tissue surrounding the posterior surface of the tail of the pancreas helps define the anterior border of the left adrenal gland. The dissection continues in the posterior and inferior fibrofatty tissue between the adrenal and kidney and proceeds anteriorly in an attempt to locate the left adrenal vein. When this is identified, it is doubly clipped and divided. The fibrofatty tissue on the superior, posterior, and medial aspects of the adrenal gland is divided using electrocautery and metal clips and the adrenal is removed.

Data were collected in a retrospective fashion in all patients by review of the medical records, including the anesthesia record, pathology report, and operative note. The operative time was defined as the time of the initial skin

incision to completion of skin closure, estimated blood loss was obtained from the anesthesia record, and length of stay was defined by the number of days in the hospital after the operative procedure.

## RESULTS

Laparoscopic adrenalectomy was performed in 10 patients over a period of 4 years. The youngest patients in our study was 23 years old, while the eldest was 64 years.

There was a female preponderance, with 8 females as compared to 2 males. Out of the 10 tumors, 6 were found to be functional. Tumors were located on the left side in 6 patients and on the right side in 4 patients.

The size of the tumor ranged from  $1.5 \times 1.5 \times 1.2$  cm to the largest being  $10.5 \times 8 \times 5$  cm. In our study the histopathological examination of the specimen's revealed 5 cases of adrenal adenomas. Two patients had pheochromocytomas and 1 patient had an adrenal teratoma. 2 patients were diagnosed to have adrenal lipomas as listed in the Table 1.

The mean operative time for laparoscopic adrenalectomies was 3 hours and 45 minutes. Blood loss ranged from 50 to 500 ml. None of the patients required blood transfusion. Complications were seen in 3 patients, 2 patients developed chest infection and 1 developed a port site hernia. No other complications were encountered.

The hospital stay ranged from 1 to 5 days with a mean of 2.5 days. Postoperative narcotic requirement was significantly low in our study.

## DISCUSSION

Classically, adrenalectomy for a benign disease has been performed by a retroperitoneal posterior or transperitoneal anterior approach. Gagner et al in 1992 described a method for removal of benign adrenal tumors through a laparoscopic approach.<sup>10</sup>

The age, gender distribution, functional status, of the tumor, tumor characteristics like site and size were consistent

**Table 1:** Demographics and clinical characteristics of patients

Patient	Age (yrs)	Gender	Site	Size (cm)	Operative time (mins)	Blood loss (ml)	Pathology	Hospital stay	Complications
1	29	Female	Left	$3 \times 2.5 \times 1$	210	500	Pheochromocytoma	5	Nil
2	23	Male	Left	$10.5 \times 8 \times 5$	180	250	Adrenal adenoma	2	Nil
3	46	Female	Right	$8.5 \times 5 \times 2$	150	100	Lipoma	2	Nil
4	25	Female	Left	$1.5 \times 1.5 \times 1.2$	155	50	Adrenal adenoma	1	Nil
5	60	Female	Left	$5 \times 3 \times 2.5$	300	250	Pheochromocytoma	3	Chest infection
6	62	Female	Left	$4 \times 2 \times 1$	225	500	Adrenal adenoma	5	Chest infection
7	56	Female	Right	$9 \times 7.5 \times 2.5$	275	400	Lipoma	2	Port site hernia
8	29	Female	Right	$7 \times 6.7 \times 3$	220	100	Mature cystic teratoma	1	Nil
9	43	Female	Right	$2.3 \times 1.2 \times 1.2$	200	100	Adrenal adenoma	3	Nil
10	64	Male	Left	$8 \times 5 \times 2$	180	50	Adrenal adenoma	1	Nil

with other studies. Jacob et al found results which are comparable to our study.<sup>11</sup>

The operative time required for laparoscopic adrenalectomy diminished progressively with repeated experience. Marked improvement was seen gradually in the technical aspects of the adrenalectomy indicating a learning curve. Similar reports were published by Prinz.<sup>12</sup>

The advantages of total transperitoneal laparoscopic adrenalectomy are better visualization of anatomy, easy accessibility and a better exposure. Similar advantages were identified by AlOtaibi.<sup>13</sup>

In our study the feasibility of the laparoscopic approach in terms of safety, outcome, efficacy and complications was similar to other well-established studies.<sup>14-17</sup> A major complication in our study was a port site hernia in one patient. Laparoscopic adrenalectomy was performed in two patients of pheochromocytoma, five patients had adrenal adenomas. Recent studies have suggested that the ability to diagnose, localize, preoperative blockade and control of the intraoperative hemodynamics of the pheochromocytomas have reached a level where laparoscopic approach can be considered safe.<sup>18</sup>

In our study there was a significant reduction in the need for parenteral pain medication, a more rapid resumption of regular diet and a significant decrease in length of postoperative stay. These results confirm and enhance other studies.<sup>19,20</sup>

## CONCLUSION

Laparoscopic adrenalectomy can be performed safely and efficiently and confers the benefits of minimally invasive surgery. Significant advantages of the laparoscopic approach are better patient satisfaction, decreased length of hospital stay and early return to normal activity.

Laparoscopic approach can be employed in most patients with adrenal pathology. Laparoscopic adrenalectomy requires the knowledge and experience of an open adrenalectomy and extensive laparoscopic experience.

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