

Our experiences with laparoscopic transperitoneal adrenalectomy

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ABSTRACT

Introduction: The aim of this study was to evaluate the outcomes of laparoscopic transperitoneal adrenalectomy cases from our clinic.

Materials and Methods: Laparoscopic transperitoneal adrenalectomy was performed on 51 patients between January 2010 and September 2017.

Results: The mean age of the 51 patients was 53.81 ± 14.006 years (range: 31–76 years). Of the total, 18 (35%) were male and 33 (65%) were female. A right adrenalectomy was performed in 30 cases (59%) and a left adrenalectomy in 21 cases (41%). All of the patients were operated on with a laparoscopic transperitoneal approach. Four patients experienced perioperative hemorrhage; however, hemostasis was achieved. There was no conversion to an open procedure in any of the patients. No hemorrhage requiring transfusion or other major complications developed postoperatively. The mean duration of the operation was 102.8 ± 21.6 minutes (range: 50–170 minutes). The mean tumor size was 3.8 ± 2.6 cm (range: 2–12 cm) based on pathology specimens. The mean duration of hospital stay was 2.61 ± 0.8 days (range: 2–6 days). The pathology results of the cases revealed surrenal adenomas in 17 cases, adrenal cortical adenomas in 13 cases, pheochromocytoma in 8 cases, adrenal cortical neoplasms in 4 cases, adrenal pseudocysts in 4 cases, adrenal nodular hyperplasia in 3 cases, malignant oncocytoma in 1 case, and an adrenal cortical neoplasm containing metastasis foci in 1 case.

Conclusion: We believe that transperitoneal laparoscopic adrenalectomy is a safe and effective method for the treatment of adrenal masses if the adequate technical equipment, experience, and knowledge are present.

Keywords: Adrenal gland masses; adrenalectomy; laparoscopy; transperitoneal.

Introduction

The adrenal glands are located in the retroperitoneal fat tissue on the anterosuperior and medial aspect of the kidneys. Surgical intervention is risky and difficult due to their proximity to the renal vessels, vena cava, and aorta.

Laparoscopic adrenalectomy (LA), which was practiced for the first time in 1992 by Gagner et al.,^[1] is a minimally invasive surgical technique that is practiced today as an alternative to conventional surgery. Laparoscopic adrenalectomy has become a gold standard in recent



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times due to a lesser need for analgesics and less bleeding during and after surgery, low complication rates, and short hospital stays.^[2]

Its indications have been further expanded in recent years, saying that large adrenal masses and adrenal metastases can also be removed laparoscopically.^[3,4] However, care needs to be taken in the selection of cases for primary adrenal malignancies. The LA technique is difficult in such cases and there are publications suggesting that there may be tumor recurrences.^[5] Therefore, it is quite safe and has mentionable advantages over open adrenalectomy, albeit only when practiced by experienced persons.^[6]

The transperitoneal and retroperitoneal approaches are practiced laparoscopically on adrenal masses and the transperitoneal approach is the most commonly practiced one. The most important advantage of the transperitoneal approach is the increased area of movement with more trocars and providing a wider field of operation. The retroperitoneal approach may be preferred in patients who have previously undergone abdominal surgery or have a history of abdominal radiotherapy and especially in patients who are overweight.^[7]

In this study, we will present our experiences with adrenalectomy with a laparoscopic transperitoneal approach in benign and malign diseases of the adrenal gland.

Materials and Methods

51 cases on whom we performed Laparoscopic Transperitoneal Adrenalectomy between January 2010 and September 2017 were retrospectively reviewed.

In the preoperative period, 36 patients had been being followed up at the department of endocrinology due to diseases such as hypertension and diabetes mellitus, and were referred to our our clinic when adrenal masses were detected during their examinations, while 7 patients were referred to our clinic after adrenal masses were incidentally detected during their examinations at other clinics. In 7 other patients, adrenal masses were detected in our clinic during their examinations due to side pain and an endocrinology consultation was required for all patients prior to operation.

The surgical decision was taken after preoperative preparations were completed and biochemical assessments were made. In cases suspected with an adrenal mass, the thyroid function, male and female sex hormones, an-

drostenedione, dihydroepiandrosterone sulfate (DHEA-S), 17-alpha-hydroxy progesterone, plasma adrenocorticotrophic hormone (ACTH), cortisol, plasma renin activity, aldosterone, metanephrine, normetanephrine, and urine catecholamine (adrenaline, noradrenaline, vanilmandelic acid) levels were measured and a dexamethasone suppression test was performed when necessary. For functional adrenal masses, the patients' blood pressure was controlled alpha-blocker (doxazosin 2x4 mg) and beta blocker (propranolol 1x40 mg or metoprolol succinate 2x50 mg) medication which was begun at least 2 weeks ahead of surgery and 2000 cc intravenous fluid was administered prior to operation. Computed tomography was performed on 42 patients and chemical shift magnetic resonance imaging was performed on 28 patients as imaging modalities.

Surgical Technique

All patients were taken into operation under general anesthesia. After antibiotic prophylaxis (Cefazolin sodium, 1 gr intravenous), the patients were placed in the Modified Flank position. Following the necessary site cleansing, the peritoneal cavity was entered with a 12 mm trocar by open access through an approximately 1 cm incision about 6–7 cm to the lateral and 3–4 cm to the superior of the navel. A pneumoperitoneum was formed such that the carbon dioxide pressure ranged between 12–14 mmHg on average. Under direct view with a 30 degree camera, a 10 mm second trocar was inserted about 3 cm to the inferior of the point of intersection of the midclavicular line and the 12th costa. The 5 mm third operation trocar was inserted in to the point of junction of the midclavicular line and the anterior superior crista iliaca line. A 5 mm fourth trocar was inserted to exclude the liver and spleen, allowing better use of the surgical field. In cases of hepatomegaly or splenomegaly, the operation may become difficult. An ultrasonic energy source (Harmonic-Scalper-Ethicon) was used for dissection. On the left side, the retroperitoneum was entered from the Toldt line and the colon was deviated to the medial. The splenorenal and splenocolic ligaments were cut. The upper pole of the kidney was reached. The adrenal vein that flows into the renal vein and subsequently, the adrenal artery was found. On the right side, entry was made from the same line and the colon and duodenum were medialized. The liver was excluded to the superior. Then, the adrenal vein leading to the kava inferior was found. During surgery, the adrenal artery and vein were clipped and cut with a Hem-o-Lok Clip (Weck Closure Systems; Research Triangle park, NC).

A similar procedure for small vessels was done with the help of a metallic clip. After the specimen was separated from the surrounding tissues, it was taken out of the body with the help of an Endobag or mini incision. A suction drain was placed in the operation area. The operation was terminated following hemostasis control.

Results

The mean age of the 51 cases who underwent laparoscopic adrenalectomy was 53.81 ± 14.006 (31–76) years. 18 (35%) cases were male and 33 (65%) were female. 30 cases (59%) underwent right adrenalectomy and 21 cases (41%) underwent left adrenalectomy (Fig. 1). All patients were operated with a transperitoneal approach. There was no conversion to an open procedure in any of the patients. 4 patients experienced peroperative hemorrhage but the hemorrhage was taken under control. No hemorrhage

requiring transfusion or another major complication developed postoperatively. The mean duration of operation was 102.8 ± 21.6 (50–170) minutes. The mean tumor size was 3.8 ± 2.6 (2–12) cm based on pathology specimens. The mean duration of hospital stay was 2.61 ± 0.8 (2–6) days. Patient characteristics and surgical outcomes are summarized in Table 1. Pathology results of the cases: We detected surrenal adenomas in 17 cases, adrenal cortical adenomas in 13 cases, pheochromocytoma in 8 cases, adrenal cortical neoplasms in 4 cases, adrenal pseudocysts in 4 cases, adrenal nodular hyperplasia in 3 cases, malignant oncocytoma in 1 case, and an adrenal cortical neoplasm containing metastasis myelolipoma in 1 case (Fig. 2).

Discussion

Today, laparoscopic adrenalectomy is the gold standard in the treatment of benign adrenal masses.^[8] Minimal bowel manipulations and small skin incisions have resulted in decreased postoperative morbidity, thus shortening the length of hospital stay and allowing better cosmetic results.^[9] Although the place of the laparoscopic surgery in the operation of the large and masses with high malignant potential is still debated, case series have been reported in recent years in which laparoscopic adrenalectomy has been successfully practiced on lesions larger than 6 cm. Surgical and oncological results similar to those of surgeons taking 6 cm as a cut-off value were reported in the cases.^[10] In our study, the adrenal mass size was 6 cm or more in the 6 cases. No problems or recurrences were found in their follow ups.

Laparoscopic surgery of the adrenal gland which is located in the upper part of the retroperitoneal region is done with the lateral transperitoneal, anterior transperitoneal, posterior retroperitoneal, and transthoracic approach techniques.^[11] All techniques have their own advantages and disadvantages. Lateral transperitoneal technique offers a wide of field of operation compared to open surgery due to the creation of a pneumoperitoneum. It enables simultaneous inspection of other adjacent organs with an optical camera and a clearer view of the guide points to which we are accustomed in open surgery. Exclusion of organs such as the spleen and liver due to gravity is better. The retroperitoneal technique provides a lessened risk of visceral injury to the surgeon while also offering the advantages of a lower risk of postoperative bowel complications and safely operating cases with intraperitoneal adhesions due to previous surgeries. In obese patients, retroperitoneal adrenalectomy is preferred because of ex-

Table 1. General overview

	Unit	Mean	Lowest	Highest
Age	Year	53.8	31	76
Duration of operation	Minutes	102.8	50	170
Tumor size	Cm	3,8	2	12
Hospital stay	Days	2.6	2	6

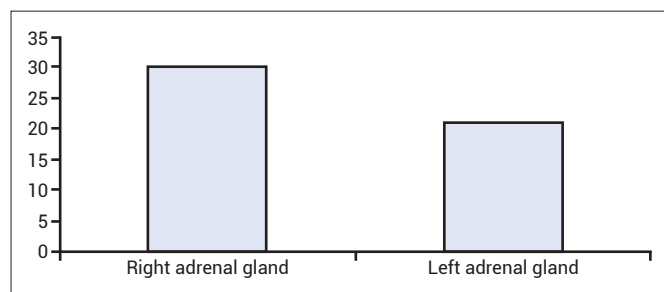


Figure 1. Tumor localization.

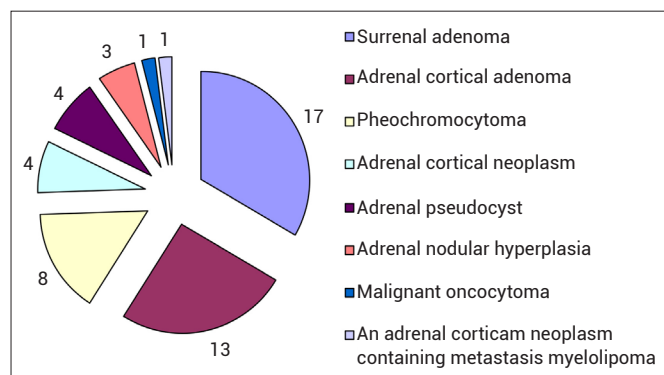


Figure 2. Specimen pathology results.

cessive fat surrounding the adrenal glands and because dissection is easier compared to the lateral transperitoneal technique. The narrow field of operation and the small number of ports that can be used have limited the use of the retroperitoneal technique.^[12] We preferred the transperitoneal method as an approach because our patients had not had abdominal surgery, it allows for wider movements, and we were more accustomed to it.

One 39-year-old male patient was a patient who was being followed up due to an epistaxis which recurred every 20 days reached a level so severe as to require blood transfusion from time to time. A mass of 3 cm was detected in the left adrenal gland on his imaging. Urine free catecholamine and its metabolites and plasma catecholamine and metanephrine levels were normal. He was diagnosed with pheochromocytoma based on his clinical symptoms and was operated. No epistaxis developed in the 8 month follow up of the patient whose clinical picture improved after the laparoscopic adrenalectomy operation. His pathology was reported as an adrenal cortical neoplasm.

The most common complication of laparoscopic adrenalectomy is hemorrhage, which is also the most common reason for conversion to open surgery. Complication rates vary between 5% and 17% in various literature.^[13–15]

In a study by Assalia and Gagner,^[16] 2,550 cases who underwent laparoscopic adrenalectomy were examined and the overall complication rate was found as 9.5%. 40% of these complications consist of hemorrhage and 4.2% of organ injuries. In the same study, the rate of conversion to open surgery was reported as 3.6%, the most common cause being hemorrhage (29.7%). In our series of 51 cases, minimal hemorrhage occurred in 4 cases. We continued the operation laparoscopically and controlled the hemorrhage. We completed all our cases laparoscopically. There was no need for postoperative blood transfusion. Our results are not consistent with the complication rates mentioned in the literature, but we believe that there should be a longer series of cases to make a healthier comparison.

In conclusion, we believe that transperitoneal laparoscopic adrenalectomy is a safe and effective method for the treatment of adrenal masses if adequate technical equipment, experience, and knowledge are present.

Disclosures

Ethics Committee Approval: This retrospective study was not approved by the Local Ethics Committee.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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