Laparoscopic transperitoneal adrenalectomy: Our initial results

Faruk Özgör, Murat Binbay, Mehmet Fatih Akbulut, Abdülmuttalip Şimsek, Murat Şahan, Ahmet Yalçın Berberoğlu, Ömer Sarılar, Ahmet Yaser Müslümanoğlu

ABSTRACT

Objective: To present the first 24 laparoscopic adrenalectomies performed in our clinic because of an adrenal mass.

Material and methods: The medical files of 24 patients who underwent laparoscopic adrenalectomy between December 2008 and March 2013 at Haseki Teaching and Research Hospital were analyzed retrospectively. The demographic characteristics of the patients were recorded. Lateral transperitoneal laparoscopic adrenalectomy was performed in all patients. The operation time was defined as the interval between the first incision of the skin and closure of the skin. Intraoperative complications, estimated blood loss and hospital stays of the patients were evaluated. Final pathologies were recorded.

Results: The mean age of the patients was 44.2 ± 8.58 years (range: 29-66 years). Nine patients were female and 15 were male. A total of 24 masses were identified in the right (n=11), and left (n=13) adrenal glands masses were identified. Eighteen patients (75%) had no symptoms, and the masses were identified incidentally. The mean operation time was 144 ± 46.1 minutes (range: 90-320 minutes), and the mean blood loss was 74 ± 12.3 mL (range: 50-130 mL). None of the patients required a blood transfusion. In one patient, liver injury was identified intraoperatively due to traction. The mean duration of hospitalization was 2.9 ± 1.1 days (range: 2-5 days). Adrenocortical adenoma and pheochromocytoma were the most common pathologies.

Conclusion: Laparoscopic adrenalectomy is a safe and effective method for the treatment of adrenal masses with low complication rates.

Key words: Adrenal mass; laparoscopic adrenalectomy; pheochromocytoma.

Introduction

Adrenal masses do not cause symptoms most of the time, and they are incidentally diagnosed during radiological examinations performed for other indications.^[1] Possibility of detection of adrenal masses during abdominal imaging varies between 4, and 6% which increases with age.^[2] Surgical intervention is not required for all incidentally detected masses, however for hormone-active masses greater than 4 cm in diameter demonstrating signs of malignancy, surgical excision has been recommended.^[3,4]

Because of close vicinity of adrenal glands to major vascular structures as aorta, and vena cava, and highly perfused organs including spleen, kidney, and liver, surgery of adrenal glands is technically very challenging. Technological advances have directed urologists from open adrenal surgery to endoscopic methods, and the

first laparoscopic adrenalectomy was performed by Gagner in the year 1992.^[5] Laparoscopic method has been has gained wide acceptance in that it has a shorter postoperative hospitalization time, and causes less severe postoperative pain with lower requirement for pain killers. Besides it has a shorter hospital stay, and recovery period with more acceptable cosmetic appearance.^[6-8] Despite all of these advantages, during laparoscopic adrenalectomy complications can be encountered with an incidence ranging between 3, and 10 percent.^[9]

In this study we aimed to present 24 cases of lateral laparoscopic adrenalectomy performed using lateral transperitoneal technique in our clinic between December 2008, and March 2013.

Material and methods

Medical files of 24 cases of laparoscopic adrenalectomy in our clinic were analyzed

Department of Urology,
Haseki Training and Research
Hospital, İstanbul, Turkey

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Correspondence:
Faruk Özgör, MD,
Department of Urology, Haseki
Training and Research Hospital,
34100 İstanbul, Turkey
Phone: +90 536 728 63 12
E-mail: md.farukozgor@yahoo.com

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retrospectively. All the operations were performed using lateral transperitoneal technique by two different surgeons (MB, and MFA). Preoperative demographic characteristics including age, gender, body mass index (kg/m^2), and concomitant diseases were recorded. Besides location, and dimensions of the adrenal masses were evaluated using computed-tomography (CT), and magnetic resonance imaging (MRI) techniques.

Before the procedure, all patients were informed about the operation to be performed, and they signed surgical informed consent forms. For all patients procedure was initiated using 3 trocars, in case of need, a fourth trocar was employed. The first trocar was placed 1/3 lateral to the line joining umbilicus to spina iliaca anterior superior. The second trocar was placed between the anterior, and midaxillary line, 2 cm below the 12. rib. The third trocar was inserted 2-3 cm above the level of umbilicus on the midaxillary line. All the patients were informed about surgical intervention, success rates, and potential complications. Besides all patients signed enlightened surgical consent forms. Preoperatively, all patients were consulted with the department of endocrinology. Plasma renin activity, levels of metanephrine, normetanephrine, aldosterone, plasma adrenocorticotrophic hormone, cortisol, 17-alpha hydroxyprogesterone, and urine catecholamine concentrations were measured. Following evaluation of these analytes, 2 weeks before the operation, combination of alpha-blocker (doxazosin 2x4 mg/d), and a beta-blocker (propranolol 1x40 mg/d) was initiated, and we tried to keep blood pressures of the patients under control. Operative time was defined as the time interval between the first skin incision, and closure of the surgical wound. Intraoperative complications, estimated amounts of blood loss, and hospital stays were analyzed.

Complications developed during the hospital stay, and within the first 30 days after discharge of the patient were considered as early phase complications. The methods used in the treatment of complications were also recorded. Finally, most recent histopathology reports of the patients were evaluated.

Statistical analysis

For the statistical analysis of data Statistical Package for the Social Sciences (SPSS) v. 13 program was used. Data were expressed as mean $\pm$ standard deviation, and percentages (%). $P < 0.05$ was accepted as statistically significant.

Results

Mean age, and BMI of a total of 24 patients were calculated as 44.2 ± 8.58 (range, 29-66) years, and 27.2 ± 3.1 kg/m^2 , respectively. In 75% (18/24) of the patients adrenal mass was encountered while searching for various etiologies. The remaining 6 patients were referred to our clinic either from division of endocrinology ($n=5$) or nephrology ($n=1$). Mean diameter of the adrenal masses was measured as 3.88 ± 1.29 mm (range, 25-76 mm), and

they were localized in the right ($n=11$) or left ($n=13$) adrenal glands. None of the patients underwent bilateral adrenalectomy. Demographic features of the patients are summarized in Table 1.

Adrenalectomies of all patients were performed using lateral transperitoneal technique. In all the left adrenalectomies 3 trocars were used. In 3 patients during right adrenalectomy, a fourth trocar was placed for the retraction of the liver. In none of the patients need for conversion to open surgery was required. Mean operative time was 144 ± 46.1 mins (range, 90-320), and mean blood loss was 74 ± 12.3 mL (range, 50-130). In any patient, blood transfusion was not required. Any fatal complication did not develop in any patient, while in one case of right adrenalectomy, during retraction of the liver, laceration of the liver parenchyma occurred. Bleeding was stopped with tamponade without any need for suturing.

Mean hospital stay of the cases was 2.9 ± 1.1 days (range, 2-5 days). No complication was observed in any of the patients was observed during their hospital stays. Only one patient consulted to our emergency outpatient clinic with discharge from wound, and redness on the wound site on the postoperative 5. day. The patient who was diagnosed as port site infection was treated with appropriate antibiotherapy. Final histopathology reports of the cases were evaluated, and the most frequently detected abnormalities were adrenocortical adenoma, and pheochromocytoma. (Table 2). All patients with pheochromocytoma were preoperatively diagnosed. In histopathological samples mean size of the adrenal mass was determined as 3.65 ± 1.14 mm.

Discussion

Most of the masses encountered in adrenal glands are benign tumors which do not lead to any complaint. Size of the

Table 1. Preoperative demographic data of the patients

Number of patients (n)	24
Female/male	9/15
Mean age	44.2 ± 8.58
Laterality (Right/Left)	11/13
Number of symptomatic patients	6/24
Body mass index (kg/m^2)	27.2 ± 3.1
Concomitant diseases	
Hypertension	6
Diabetes mellitus	1
COPD	1
Number of patients with detected endocrinologic diseases	7
COPD: Chronic Obstructive Pulmonary Diseases	

Table 2. Peri-, and postoperative data of the patients

Mean operative time (min.)	144±46.1
Average amount blood loss (mL)	74±12.3
Perioperative complication	1/24
Need for blood transfusion	0/24
Number of cases necessitating use of fourth trocar	3/24
Average hospital stay (days)	2.9±1.1
Postoperative complications (n)	1/24
Pathological evaluation	
Adenoma	14
Cyst	2
Myelolipoma	1
Pheochromocytoma	5
Hemangioma	1
Metastasis	-
Carcinoma	1

mass plays an important role in approach to these masses. Current guidelines recommend adrenalectomy for active hormone producing masses greater than 4 cm in diameter.^[10,11] However, diverse opinions about approach to smaller mass lesions are available in the literature. Bulow et al.^[12] followed up 229 patients with adrenal masses for 30 months, and observed development of hormonal activity only in 3% of these patients. On the other hand, Liebe et al.^[13] followed up 64 patients for 3 years, and reported development of endocrinological disorders in 28% of these patients, and higher risk in patients with adrenal masses greater than 3 cm in diameter. Still during these follow-ups 0.8 cm increase in the dimensions of the mass was found to be significant as for malignant differentiation.^[14]

For adrenal masses, open or laparoscopic surgery can be safely applied. Improvement in the postoperative quality of life, and demonstration of its safety as an oncologic method have led to an increase in the number of centers performing laparoscopic adrenalectomy. Many literature studies have compared open, and laparoscopic adrenalectomies, and asserted advantages of laparoscopic method over open surgery as for complications, blood transfusion, and hospital stay.^[15] In cases with larger masses or those necessitating concomitant surgery in combination with adrenal surgery or in conditions where signs of invasion into surrounding tissues were detected, open adrenalectomy should be preferred. Liao et al. reported that they preferred open surgery for masses greater than 8 cm which would create difficulties in their dissection, and hemostatic control.^[16,17] However with increasing expertise in recent years, size of

the mass is no longer an indication for open surgery, and various authors have reported their laparoscopic adrenalectomy experience for larger adrenal masses.^[18]

Nowadays, for laparoscopic adrenalectomy, four different techniques as lateral transperitoneal, anterior transperitoneal, transthoracic, and posterior retroperitoneal techniques have been described.^[19] Currently lateral transperitoneal method is the most frequently used method which is also preferred by our clinic. The opportunity to work in a wider surgical field, and clearer visualization of surrounding organs are the most important advantages of this method. Besides these characteristic features of laparoscopic adrenalectomy can be assessed as an advantage for urologists at the beginning of their learning curve. Previous abdominal surgery or truncal obesity leading to the development of Cushing disease can complicate application of this method. In our series 4 patients had previously undergone open surgery, and camera port was inserted under direct observation. However in the retroperitoneal method, visceral organ injury has a lower incidence. Narrower surgical field, and increased requirement for experience seem to be the most important disadvantages of this method.

Despite its advantages, laparoscopic adrenalectomy is not completely free of complications. Bleeding is detected to be the most frequently encountered complication, and it is frequently observed in patients undergoing adrenalectomy for pheochromocytoma.^[20] In these patients we think that increased, and fluctuating blood pressure values during operation are one of the major influential factors on hemorrhagic complications. Besides close vicinity of adrenal gland to vena cava, and renal vein is another influential factor. During exploration of the adrenal gland, surrounding organs such as liver, spleen, bowels, and pancreas can be injured. In our study, during intraoperative retraction, hepatic laceration occurred which was repaired conservatively. In some studies, operative times were apparently associated with increased complication rates. However in complicated, and challenging cases, naturally longer operative times must be taken for granted.^[21]

Rarely, during laparoscopic adrenalectomy, conversion to open surgery is required. Apart from complications, tumour size, and underlying pathology are important factors effective on the conversion to open surgery. Walz et al.^[22] detected that tumor size greater than 6 cm in diameter decreased the probability of completion of the surgery by laparoscopic technique. Besides, unpredicted adhesions of the mass undetectable in CT or MR to surrounding tissues may be another reason necessitating conversion to open surgery. Parnaby et al.^[23] indicated that in patients undergoing surgery with the indication of pheochromocytoma, probability of conversion to open surgery was higher. Even though contrary opinions have been advocated in the literature,

higher body mass index is a risk factor necessitating conversion to open surgery.^[24]

Intraoperatively, histopathologically benign adrenal masses are more frequently encountered. In a series of 52 patients adrenalectomized by Zacharias et al.^[25] 34 patients with benign pathology had been reported. These outcomes were supported by Suresh et al.^[26] In our series, 18 of 24 cases had benign pathologies. Five hormone-active patients, and one patient with adrenocortical carcinoma consulted to departments of endocrinology, and medical oncology, respectively.

The present study is one of the rarely performed investigations on laparoscopic adrenalectomy in our country, however scarce number of study population, and retrospective analysis of patients' information are the most important limitations of the study. Besides lack of any comparator group is another limitation of the study.

In conclusion, laparoscopic adrenalectomy is a safe, and effective method in the treatment of adrenal masses. Potential complications will decrease if urologists use lateral transperitoneal technique in the beginning of their learning curve.

Ethics Committee Approval: Due to retrospective nature of the study, ethics committee approval was not required.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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