Expectations and Outcomes When Moving from Open to Laparoscopic Adrenalectomy: Multivariate Analysis

Marco Barreca, M.D.,[1] Luigi Presenti, M.D.,[2] Cristina Renzi, M.D., M.Sc.,[3] Giuseppe Cavallaro, M.D.,[1]
Andrea Borrelli, M.D.,[2] Francesco Stipa, M.D.,[1] Andrea Valeri, M.D.[2]

[1]1st Department of Surgery "Pietro Valdoni," Universitá "La Sapienza," Via Lancisi, 2-00161 Rome, Italy
[2]Department of General and Vascular Surgery, Azienda Ospedale di Careggi, Viale Pieraccini, 17-50139 Florence, Italy
[3]Health Care Quality Research Unit, Istituto Dermopatico dell'Immacolata (IDI-IRCCS), Via dei Monti di Creta, 104-00167 Rome, Italy

Abstract. Various authors have suggested that laparoscopic adrenalectomy (LA) leads to better surgical outcomes than open surgery. The debate is still open, however, and indications and limitations of minimally invasive surgery have not been completely established. The objective of our study was to compare surgical outcomes of LA and open adrenalectomy (OA), using multivariate analysis to adjust for potential confounding factors (e.g., size of the lesion, histology). Between 1995 and June 2000 at "Careggi" Hospital in Florence, Italy patients with an indication for adrenalectomy were treated laparoscopically if the lesion was < 10 cm and there was no clinical evidence of malignancy. All 79 patients who underwent LA have been included in this study. Among 152 patients who underwent OA at "La Sapienza" University in Rome, 93 had an adrenal lesion < 10 cm and no clinical evidence of malignancy; they were selected for comparison. Multivariate analysis has been used to analyze the effect of the surgical approach (OA vs. LA) on the surgical outcome, controlling for potential confounders. Multiple logistic regression showed that there is no significant difference in intraoperative outcomes (i.e., surgical time > 2 hours, blood loss ≥ 500 ml) between patients operated on through a traditional approach and those who underwent LA. On the other hand, patients operated on laparoscopically have a significantly higher probability than the OA group of experiencing a better recovery from surgery (i.e., require less postoperative analgesics and return to normal activities earlier). The results of the present study show that, although LA does not add much benefit in terms of expected intraoperative outcomes, it dramatically speeds patients' recovery from surgery. The two approaches are complementary and should both be integrated into the technical background of all endocrine surgeons.

Surgical resection has long been considered the treatment of choice for many adrenal disorders. Because of the unique location of the adrenals high in the retroperitoneal space, access to these deeply located glands has always constituted a surgical challenge for endocrine surgeons. In 1992 Gagner et al. [1] were among the first to describe an adrenalectomy performed laparoscopically. Since then, various studies have been conducted to evaluate the feasibility, indications, and outcomes of minimally invasive surgery for treating adrenal disorders [2, 3] and in other fields of endocrine surgery [4].

Some studies show promising results of laparoscopic adrenalectomy (LA) [3, 5–13] but are limited by the relatively small number of patients. Large studies including 60 to 170 patients have been reported [14–19] by centers pioneering the laparoscopic approach, but many of them lacked a comparison group of patients treated with an open approach [14–16]. Others compare laparoscopic and open approaches [17–19], but to our knowledge no study has used multivariate analysis to measure the effect of possible confounders.

Even though various authors have suggested that laparoscopic adrenalectomy might lead to better clinical outcomes than open surgery [14], the debate is still open. Indications and limitations of minimally invasive surgery have not been completely established, and the role of LA still needs to be defined.

The aim of the present study was to compare clinical outcomes of open versus laparoscopic adrenalectomy, controlling for potential confounding variables (age, dimension, histology of the lesion, history of previous surgery). Specific aims are to compare the duration of surgery, blood loss, need for postoperative analgesics, and time for returning to normal activities of patients who underwent an open adrenalectomy (OA) versus those treated laparoscopically.

Methods

Two groups of patients were included in the study. The first group includes the 79 consecutive patients who underwent laparoscopic transperitoneal adrenalectomy as described by Gagner et al. [20] at the Department of General and Vascular Surgery, Ospedale Careggi, Florence between January 1995 and June 2000. Since 1995 in this institution patients with an adrenal lesion < 10 cm and with no clinical evidence of malignancy have been operated on laparoscopically. The second group consists of 93 patients selected from the 152 consecutive patients operated on with an open adrenalectomy at the 1st Department of General Surgery, Policlinico Umberto I, Rome. The 93 patients were selected based on the aforementioned criteria (adrenal lesion < 10 cm, no clinical evidence of malignancy) so there were two comparable groups.

Information on the following surgical outcomes have been ob-

Correspondence to: M. Barreca, M.D., Via Della Balduina, 79 00136, Rome, Italy

tained from clinical records: duration of the operation, blood loss, number of transfusions, number of analgesic doses, length of hospital stay, days needed for returning to preoperative activities, and perioperative complications. Data were also collected on patient age, histology of the lesion, dimension of the mass, and history of previous surgery.

Means and standard deviations are reported for continuous variables; subsequently they were transformed into the following categorical variables: (1) surgical time ≤ 2 hours or > 2 hours; (2) blood loss < 500 ml or ≥ 500 ml; (3) number of analgesic doses (ketoprofen 50 mg/ml IV) < 4 doses or ≥ 4 doses; (4) postoperative hospital stay 2 to 3 days, 4 to 7 days, 8 to 14 days, or > 14 days; (5) return to preoperative activities ≤ 14 days, 15 to 21 days, 22 to 28 days, or > 28 days. Cutoffs were chosen based on the frequency distributions of the variables in our sample, with the intent to obtain large enough subgroups to be statistically useful. Demographic and clinical characteristics of patients and surgical outcomes were examined separately for the two study groups. The Pearson X^2 test was used to determine if differences between the two groups were statistically significant ($p < 0.05$).

Multiple logistic regression was used to analyze the effect of the surgical approach (open vs. laparoscopic surgery) on surgical outcomes, controlling for potential confounders. In particular, outcomes included in the multivariate analysis were surgical time (> 2 vs. ≤ 2 hours), blood loss (≥ 500 vs. < 500 ml), analgesic doses (≥ 4 vs. < 4 doses), and days needed for returning to normal activities (> 21 vs. ≤ 21 days after surgery). A separate model was used for each outcome. Patient age, the dimension and histology of the lesion, and a history of previous surgery in the retroperitoneum or upper abdominal region were considered potential confounders.

Postoperative complications have been classified into four grades according to the system proposed by Clavien et al. [21]. Grade I includes minor complications (atelectasis, urinary tract infection). Grade II includes complications that may require more complex intervention but do not leave any permanent damage. It is further divided into grade IIa (postoperative transfusion or pharmacologic therapies) and grade IIb (invasive therapeutic procedures or reintervention). Grade III includes all complications from which a certain degree of deficit or partial loss of function of an organ (pulmonary embolism, myocardial infarction) persists. Grade IV includes events that cause postoperative death.

The STATA-5 statistical package (Stata Corp., College Station, TX, USA) was used for statistical analysis.

Results

There were 36 men and 57 women in the OA group compared to 30 men and 49 women in the LA group. The mean age was 43.6 years in the OA group versus 49.4 years in the LA group. Of the 93 patients operated on with an open approach, 18 had had previous retroperitoneal or upper abdominal surgery, compared with only one patient in the laparoscopic group. Table 1 shows the indications for surgery and corresponding pathology in the two study groups. Indications were not statistically different between the two groups ($p = 0.502$), although the operation rate for incidentalomas was slightly higher in the LA group than in the OA group (35.4% vs. 25.8%). All incidental lesions were diagnosed by ultrasonography or computed tomography (CT) during workups for various abdominal diseases (e.g., biliary or renal colic, trauma, weight loss).

Table 1. Indications for surgery and corresponding pathology.

Histology	Open ($n = 93$)		Laparoscopic ($n = 79$)	
	No.	%	No.	%
Incidentaloma	24	25.8	28	35.5
Adenoma	7/24	21.2	22/28	78.6
Hyperplasia	7/24	21.2	0/28	0
Myelolipoma	4/24	16.6	2/28	7.1
Carcinoma	4/24	16.6	1/28	3.6
Cyst	2/24	8.4	3/28	10.7
Conn syndrome	26	28.0	17	21.5
Adenoma	17/26	65.4	17/17	100
Hyperplasia	9/26	34.6	0/17	0
Cushing syndrome	18	19.4	13	16.5
Adenoma	11/18	61.1	9/13	69.2
Hyperplasia	6/18	33.3	2/13	15.4
Carcinoma	1/18	5.6	1/13	7.7
Cyst	0/18	0	1/13	7.7
Pre-Cushing syndrome	3	3.2	4	5.0
Adenoma	2/3	66.7	4/4	100
Hyperplasia	1/3	33.3	0/4	0
Pheochromocytoma	14	15.0	9	11.4
Pheochromocytoma	12/14	85.7	9/9	100
Adenoma	2/14	14.3	0/9	0
Adrenogenital syndrome	4	4.3	1	1.3
Adenoma	2/4	50	0/1	0
Carcinoma	2/4	50	1/1	100
Metastasis/adenoma	4	4.3	7	8.8
Metastasis	4/4	100	6/7	85.7
Adenoma	—		1/7	4.3

The indication for resecting all nonfunctioning tumors was the size of the lesion (> 5 cm for the OA group and > 4 cm for the LA group).

All patients underwent unilateral adrenalectomy. The operation was associated with other minor procedures (e.g., cholecystectomy) in 10.6% of the OA patients and 6.4% of the LA group.

The mean ($\pm$ SD) size of the lesions was 3.8 ± 1.8 cm (range 1.5–9.0 cm) for the OA group and 3.9 ± 1.4 cm (range 1.5–9.0 cm) for the LA group. Altogether, 20 of 24 (83.5%) and 27 of 28 (96.5%) incidentally discovered lesions in the OA and LA groups, respectively, were histologically benign (i.e., adenoma, hyperplasia, myelolipoma, cyst) whereas 4 of 24 (16.5%) and 1 of 28 (3.5%) (OA vs. LA) were unsuspected carcinomas. The other three patients with a carcinoma presented with adrenogenital syndrome (two patients) or Cushing syndrome (one patient). A preoperative diagnosis of pheochromocytoma was confirmed in all LA patients and in 21 of 23 OA patients (91.5%), whereas an adenoma was diagnosed at pathology in the other two OA patients. All other histologic findings are shown in Table 1.

The mean ($\pm$SD) surgical time was 168.6 ± 63.9 minutes (range 60–400 minutes) for OA patients and 132.3 ± 36.5 minutes (range 60–305 minutes) for LA patients. The mean ($\pm$SD) blood loss was 269.0 ± 154.9 ml (range 50–700 ml) in the OA group and 208.2 ± 127.4 ml (range 50–700 ml) in the LA group. Five patients (5.3%) in the OA group needed one or two postoperative blood transfusions, whereas only one LA patient (1.2%) needed one blood transfusion after the operation ($p = 0.295$). Four patients (4.3%) in the OA group and one patient (1.2%) in the LA group had splenic injury that required splenectomy ($p = 0.468$).

The mean ($\pm$SD) postoperative hospital stay was 10.0 ± 4.1 days (range 3–30 days) for OA patients versus 4.2 ± 2.3 days (range 2–15 days) for LA patients. The time for returning to normal activities

Table 2. Outcome of surgery.

Outcome	Open ($n = 93$)		Laparoscopic ($n = 79$)		
	No.	%	No.	%	p^*
Surgical time (hours)					
≤ 2	29	31.2	30	38.0	0.350
> 2	64	68.8	49	62.0	
Blood loss (ml)					
≤ 500	77	83.7	73	92.4	0.084
> 500	15	16.3	6	7.6	
No. of transfusions					
0	87	94.6	78	98.7	0.140
≥ 1	5	5.4	1	1.3	
Analgesics (no. of doses)					
< 200 mg	19	20.4	60	76.0	< 0.001
≥ 200 mg	74	79.6	19	24.0	
Hospital stay (days)[a]					
2–3	1	1.1	41	51.9	< 0.001
4–7	18	19.6	33	41.8	
8–14	68	73.9	4	5.0	
≥ 15	5	5.4	1	1.3	
Return to normal activities (days)					
≤ 14	0	0	18	22.8	< 0.001
15–21	3	3.3	37	46.8	
22–28	65	70.6	24	30.4	
≥ 29	24	26.1	0	0	

*Pearson's χ^2 test.
[a]Postoperative days.

was 29.4 ± 17.8 days (range 14–67 days) for OA patients and 18.8 ± 11.1 days (range 7–28 days) for LA patients. These continuous variables have been subsequently transformed into categorical variables, as described in the Methods section. The results of univariate analysis are shown in Table 2.

The postoperative course was uneventful in most patients in both groups, as shown in Table 3. Two patients, one operated on with an open approach (1.0%) and one laparoscopically (1.2%), died postoperatively. Both patients had Cushing syndrome, one caused by bilateral adrenal hyperplasia and the other by an adenoma. The first patient had associated diabetes and a history positive for myocardial infarction; she was scheduled for a two-stage LA but died of congestive heart failure after the first procedure on postoperative day (POD) 10. The second patient died of cardiac arrest on POD 5. The complication rate was 9.6% in the OA group and 5.0% ($p = 0.315$) in the LA group. Postoperative recovery was complicated by retroperitoneal hemorrhage in five OA patients (5.3%) and in one LA patient (1.2%). One OA patient needed reoperation; the other five were managed conservatively. One LA patient was reoperated on the third postoperative day for duodenal perforation. All other complications in the LA group were treated conservatively.

We used multiple logistic regression to examine the association between surgical access (open versus laparoscopic) and intraoperative or postoperative outcomes. Patients' age, dimensions, histology of the lesion, and history of previous surgery in the retroperitoneum or upper abdomen were included as potential confounders in the multiple logistic regression models shown in Tables 4–7. Controlling for the aforementioned confounders, no differences were found in the probability of experiencing better intraoperative outcomes (i.e., surgical time ≤ 2 hours and blood loss < 500 ml) between the two surgical approaches. On the other hand, patients who undergo OA have a significantly higher probability than those

Table 3. Postoperative complications according to the classification of Clavien.

Complication	Open ($n = 93$)		Laparoscopic ($n = 79$)	
	No.	%	No.	%
Grade I				
Urinary tract infection	0		1	1.2
Grade IIa				
Bronchopneumonia	0		1	1.2
Hemorrhage (transfusion)	4	4.3	1	1.2
Grade IIb				
Hemorrhage (reoperation)[a]	1	1.0	0	
Pleural effusion	1	1.0	0	
Duodenal perforation	0		1	1.2
Bleeding gastric ulcer[a]	1	1.0	0	
Colocutaneous fistula	1	1.0	0	
Grade III				
Myocardial infarction	1	1.0	0	
Grade IV				
Cardiac arrest	1	1.0	1	1.2

[a]Patient was operated on the first postoperative day for retroperitoneal hemorrhage and the twelfth postoperative day for a bleeding gastric ulcer.

Table 4. Multiple logistic regression for various parameters relative to operating time.

Parameter	Operating time: > 2 hours vs. ≤ 2 hours		
	OR	95% CI	p
Surgical access			
Laparoscopic	1.00		
Open surgery	1.07	0.5–2.2	0.846
Age (years)			
≤ 49	1.00		
≥ 50	0.99	0.5–1.9	0.976
Lesion size (cm)			
≤ 3	1.00		
3.1–6.0	0.35	0.1–0.9	0.021
> 6	0.43	0.1–1.5	0.183
Histology			
Benign	1.00		
Malignant	2.49	0.8–8.2	0.133
History of previous surgery			
No	1.00		
Yes	1.38	0.4–4.9	0.615

OR: odds ratio; CI: confidence interval.

who undergo LA of needing more than four doses of ketoprofen (odds ratio (OR) 10.89, $p < 0.001$) and returning to normal activities more than 21 days after surgery (OR 271.59, $p < 0.001$).

In addition to the surgical approach, other variables were significantly and independently associated with some surgical outcomes. In particular, there was a higher probability of an operating time shorter than 2 hours (OR 0.35, $p = 0.021$) for lesions > 3 cm and ≤ 6 cm, but no differences were noted for other outcomes. Furthermore, patients with a history positive for previous surgery are exposed to a higher risk of blood loss of > 500 ml (OR 3.93, $p = 0.039$). Nevertheless, the association between previous surgery and an increased risk of blood loss applies only to the OA group, which includes most of these patients), whereas no conclusive relation between previous operations and blood loss could be demonstrated for the LA group. Finally, excision of malignant lesions was not associated with worse surgical outcomes, after either OA or LA.

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Table 5. Multiple logistic regression for various parameters relative to blood loss.

Parameter	Blood loss: ≥ 500 ml vs. < 500 ml		
	OR	95% CI	p
Surgical access			
Laparoscopic	1.00		
Open surgery	1.66	0.5–5.1	0.369
Age (years)			
≤ 49	1.00		
≥ 50	0.81	0.3–2.2	0.672
Lesion size (cm)			
≤ 3	1.00		
3.1–6.0	0.92	0.3–3.3	0.894
> 6	1.61	0.3–7.4	0.542
Histology			
Benign	1.00		
Malignant	1.85	0.5–6.7	0.349
History of previous surgery			
No	1.00		
Yes	3.93	1.1–14.5	0.039

Table 6. Multiple logistic regression for various parameters and analgesic doses.

Parameter	No. of analgesics: doses ≥ 4 vs. < 4		
	OR	95% CI	p
Surgical access			
Laparoscopic	1.00		
Open surgery	10.89	4.7–22.4	< 0.001
Age (years)			
≤ 49	1.00		
≥ 50	1.25	0.5–2.5	0.569
Lesion size (cm)			
≤ 3	1.00		
3.1–6.0	1.35	0.4–2.5	0.511
> 6	1.69	0.6–7.3	0.443
Histology			
Benign	1.00		
Malignant	0.68	0.2–3.2	0.558
History of previous surgery			
No	1.00		
Yes	7.41	0.9–63.4	0.068

Table 7. Multiple logistic regression for various parameters relative to the return to previous activities.

Parameter	Return to previous activities: > 21 days vs. ≤ 21 days		
	OR	95% CI	p
Surgical access			
Laparoscopic	1.00		
Open surgery	271.59	45.5–1620.8	< 0.001
Age (years)			
≤ 49	1.00		
≥ 50	8.02	2.4–27.2	0.001
Lesion size (cm)			
≤ 3	1.00		
3.1–6.0	1.34	0.3–5.6	0.689
> 6	0.63	0.8–5.0	0.658
Histology			
Benign	1.00		
Malignant	3.82	0.7–20.2	0.115

Indications for Surgery

Indications for adrenal surgery are well established and, in general, should not change with the advent of minimally invasive surgery. Nevertheless, some new controversies have arisen regarding the correct indications for surgical excision of incidentally discovered lesions [23]. In our experience incidentalomas represented 25% of preoperative diagnosis in those patients who were operated on with an open approach versus 35% in those treated with the laparoscopic approach. Although this difference was not statistically significant, it certainly reflects a trend toward a higher rate of operations for incidentalomas with the minimally invasive approach. In fact, as our experience with laparoscopic surgery increases, we have established, in accordance with our endocrinologists, a more aggressive approach that extends the indications for resection to all solid lesions with a diameter > 4 cm. We believe that in the presence of lesions ≥ 4 cm adrenalectomy can be recommended as a valid, safe, cost-effective alternative to serial CT scans or magnetic resonance imaging (MRI) follow-up, even if a functional tumor is not present.

Complications

The results of our analysis show that, performed in a specialized center, LA is burdened by a relatively low incidence of intra- or postoperative complications. In fact, we observed a trend toward a lower incidence of some complications after LA than after OA, although not at a statistically significant level. In particular, we experienced a reduction in the rate of associated incidental splenectomy and intraoperative bleeding during LA. The magnified laparoscopic vision and the use of gravity rather than traction on the spleen are plausible explanations for the observed decrease in splenic injury. No major complications related to splenectomy occurred in our group, as only one patient developed pleural effusion. Although the risk of lethal sepsis following splenectomy is rare in adults, it is our practice to administer polyvalent pneumococcal vaccine during the early postoperative period to all patients who undergo incidental splenectomy.

Approach

Most studies have compared the open anterior [11–13, 17, 18, 24–26], lateral retroperitoneal [9], and open posterior [7, 8] ap-

Discussion

Surgical Outcomes

The present study shows that LA is advantageous, compared to OA, in terms of length of hospital stay, reduction of postoperative pain, and return to normal activities. As many studies report that LA is superior to OA, one should keep in mind that most of those results come from tertiary referral centers [1–4, 14–19]. LA represents a technically challenging procedure and in our experience does not show intraoperative benefits over OA (i.e., shorter surgical time, less blood loss, less need for blood transfusions). Performance characteristics and operating time as an expression of these parameters are influenced by the surgeons' experience, with a "learning curve" that reaches a plateau after as many as 100 cases [22]. Our experience includes a sufficient number of patients treated laparoscopically, and our results are likely to be indicative of the effective outcomes of this approach.

proaches with laparoscopic transperitoneal lateral adrenalectomy. With laparoscopic surgery, as well as open surgery, the debate on the choice of the ideal surgical approach (anterior, lateral, or posterior) is still open. It may depend on numerous factors, such as the nature of the lesion, the dimension of the mass, its localization, the patient's physical constitution, and the surgeon's experience or preference. Some authors have proposed the posterior retroperitoneal laparoscopic approach as a better option for patients who have undergone previous operations and for those with coexisting cardiopulmonary diseases [5, 6, 25, 26]. Fernandez-Cruz et al., in a prospective randomized trial, compared transperitoneal laparoscopic adrenalectomy (TPLA) with retroperitoneal laparoscopic adrenalectomy (RPLA) in 15 patients with Cushing syndrome [25]. In both groups the authors observed an increase in arterial carbon dioxide tension ($PaCO_2$) compared with basal values, but the increase was greater in the TPLA group. Furthermore, the mean blood pressure increased significantly only during TPLA. Despite these findings favoring RPLA, we believe that the disadvantages of this approach (i.e., absence of anatomic landmarks, restricted operative view) do not balance the possible advantages with respect to cardiopulmonary function. Takeda et al., also advocates of the retroperitoneal approach, restrict RPLA to patients with primary aldosteronism and do not recommend it in patients with Cushing syndrome, in whom retroperitoneal fat dissection is much more difficult [6].

Size of the Lesion

Some surgeons limit the diameter of the adrenal lesion at 6 cm to ensure an easy laparoscopic resection [4, 11, 15, 25]; others report operating laparoscopically on masses up to 12 cm [14, 27]. In our experience, the largest laparoscopically resected lesion was 9 cm, and dimensions larger than 6 cm have not been shown at multivariate analysis to be associated with a significantly higher probability of adverse surgical outcomes. Nevertheless, because of the more difficult control of hemorrhage with laparoscopy, we agree with Henry et al. that lesions > 6 cm should probably be approached only by skilled laparoscopic surgeons [19].

Laparoscopic Surgery and Adrenal Malignancies

In accordance with the literature [14, 19], we believe that a definitive preoperative diagnosis of adrenal carcinoma or malignant pheochromocytoma represents an absolute contraindication to laparoscopic adrenalectomy. This is due to the potential difficulty of the procedure, which may extend to en bloc resection of kidney, perirenal fat, spleen, and periaortic lymph nodes. In our experience with three patients treated laparoscopically, the postoperative diagnosis revealed an adrenal carcinoma. In these three patients the dimensions of the lesions ranged from 5 to 7 cm; and in each case some difficulty was encountered dissecting the gland from the surrounding tissues. In one patient a local recurrence, with direct liver infiltration, was detected 8 months after surgery. A segmentectomy (segment VII) was performed, but the patient eventually died 4 months after the second operation. The other two patients are alive and free from recurrence 1 year after surgery.

Henry et al. reported their personal experience with 48 laparoscopic adrenalectomies performed for lesions > 4 cm [19]. They observed six (12.5%) malignant tumors, three of which were metastases, two were adrenal carcinomas, and one was a leiomyosar-

coma. In three cases the procedure was converted to open surgery; in the remaining three cases the diagnosis was achieved by histologic assessment. Although all patients are alive at 1 to 4 years of follow-up, the authors concluded that in the presence of a suspected malignancy it is advisable to convert the procedure to open surgery. Laparoscopy maintains a role in these cases, however, as part of the diagnostic workup. If the adrenal lesion is a solitary metastasis and the primary neoplasm has been previously resected, the procedure can be concluded laparoscopically. Complete resection of the adrenal was conducted without difficulty in our six LA cases, and three patients were alive at 3 years.

Laparoscopic Adrenalectomy and Pheochromocytoma

Some believe that the use of minimally invasive techniques should be discouraged because of the possibility of a sudden surge in catecholamine levels during laparoscopic procedures, with subsequent hemodynamic instability [26, 28]. In our experience, the presence of a pheochromocytoma does not add much difficulty to laparoscopic dissection compared with other histologic lesions (mean operating time was only 13 minutes longer; blood loss was 227 ml versus 203 ml). We believe, with others, that adequate perioperative management and careful intraoperative monitoring of vital functions guarantee satisfactory hemodynamic control, regardless of the surgical approach chosen [29, 30].

Conclusions

The results of this study show that LA performed through a transperitoneal lateral approach is a safe, effective, well tolerated procedure. Although intraoperative outcomes may not differ from those of open surgery, LA performed through a transperitoneal lateral approach offers more advantages in terms of postoperative outcomes. Open surgery still has a role in the treatment of large masses and clinically malignant lesions. The two approaches remain complementary and should be an integral part of the technical background of every experienced endocrine surgeon.

Résumé. De nombreux auteurs ont suggéré que la surrénalectomie par laparoscopie (SL) a de meilleurs résultats que la surrénalectomie par chirurgie ouverte (SO); cependant, le débat reste ouvert, et les indications et les limitations de la chirurgie mini-invasive ne sont pas complètement établies. Le but de cette étude a été de comparer l'évolution chirurgicale de la SL comparée à la SO, par analyse multivariée afin d'ajuster pour des potentiels facteurs dépendants (par ex la taille de la lésion, l'histologie). Entre 1995 et juin 2000, à l'hôpital "Careggi" de Florence, Italie, les patients porteurs de lésion < 10 cm ont été traités par laparoscopie s'il n'y avait aucune évidence clinique de lésion maligne. Tous les 79 patients qui ont eu une SL sont inclus dans cette étude. Parmi les 152 patients qui ont eu une SO à l'Université "La Sapienza" de l'université de Rome, 93 avaient une lésion de la surrénale < 10 cm sans évidence clinique de lésion maligne et ainsi ont été sélectionnés à titre de comparaison. L'analyse multivariée a été utilisée pour évaluer l'effet de l'approche chirurgicale (SL ou SO) sur le résultat chirurgical, en contrôlant les facteurs dépendants. La régression logistique multiple a montré qu'il y avait aucune différence significative en ce qui concerne l'évolution chirurgicale (c'est-à-dire la durée de l'intervention > 2 heures, les pertes sanguines ≥ 500 ml) entre les patients opérés par une approche traditionnelle ou ceux qui ont eu une SL. D'un autre côté, les patients opérés par laparoscopie avaient une probabilité plus élevée d'une meilleure récupération de l'acte chirurgical (c'est-à-dire moins besoin d'analgésiques postopératoire, et retour plus précoce aux activités normales). Les résultats de cette étude ont montré que, même si la SL ne comporte pas d'avantage en peropératoire, elle améliore remarquablement la récupération post-opératoire des patients. Les deux

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approches sont complémentaires, et devraient faire partie de l'arsenal technique de tout chirurgien endocrine.

Resumen. Según algunos autores la adrenalectomía laparoscópica (LA) proporciona mejores resultados que la realizada mediante cirugía convencional (OA). Sin embargo, el debate sigue abierto pues no se han establecido todavía las indicaciones y limitaciones de la cirugía mínimamente invasiva. El objetivo de nuestro estudio fue comparar los resultados de la LA con los de la OA utilizando análisis multivariantes para averiguar la importancia de factores discutibles tales como p. ej. el tamaño del tumor o la histología del mismo. Entre 1995 y junio de 2000, en el Hospital Careggi de Florencia (Italia) la adrenalectomía laparoscópica LA, se indicó en todos aquellos pacientes cuyas tumoraciones eran menores de 10 cm, sin presentar signos clínicos de malignidad. Los 79 pacientes tratados mediante LA están incluidos en el presente estudio. Entre los 152 pacientes tratados en "La Sapienza" Universidad de Roma, 93 presentaban tumoraciones de las cápsulas suprarrenales < 10 cm, sin clínica alguna de malignización; estos pacientes constituyen el grupo control. Mediante análisis multivariante evaluamos los efectos del abordaje (OA vs. LA) sobre los resultados quirúrgicos. La regresión logística múltiple, demostró que no existen diferencias significativas entre ambos grupos por lo que a los resultados intraoperatorios se refiere (i.e., duración de la operación > 2 horas, hemorragias ≥ 500 ml). Por el contrario, el postoperatorio de los pacientes intervenidos por LA fue mucho mejor, recuperándose más rápidamente (i.e. requirieron menos analgésicos en el postoperatorio y retornaron a sus actividades normales más precozmente). Los resultados de este estudio demuestran que la LA no supone mejora alguna por lo que al periodo intraoperatorio se refiere, pero reduce drásticamente el tiempo de recuperación del paciente. Ambos abordajes son complementarios y deben, por tanto, integrarse y formar parte de los conocimientos y habilidades técnicas de todo cirujano endocrinológico.

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