

## Multicentric experience of the Belgian Group for Endoscopic Surgery (BGES) with endoscopic adrenalectomy

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Received: 25 March 1997/Accepted: 16 May 1997

### Abstract

**Background:** Adrenalectomy is not a frequent operation. Therefore the newly developed laparoscopic approach is sporadically performed by surgeons dealing with endocrine disorders.

**Methods:** Some 54 videoendoscopic adrenalectomies performed on 52 patients by five surgical teams between October 1993 and December 1996 were prospectively evaluated.

**Results:** Indications for endoscopic adrenalectomy were pheochromocytoma ( $n = 17$ ), primary hyperaldosteronism ( $n = 15$ ), Cushing's adenoma or disease ( $n = 7$ ), nonsecreting adenoma ( $n = 7$ ), single metastasis from adenocarcinoma ( $n = 2$ ), adenoma with dehydroepiandrosterone (DHEAS) hypersecretion ( $n = 3$ ), and ACTH-secreting metastases from a thymoma ( $n = 1$ ). Of the 54 adrenalectomies performed, 31 were of the left gland, 19 of the right and two bilateral. Laparoscopic adrenalectomy was successful in 50 patients (96%). Median tumor size was 4 cm (range 1.5–12), median operation duration was 80 min (range 59–360), and median postoperative stay was 4 days (range 2–13). One patient required blood transfusion.

**Conclusions:** Endoscopic adrenalectomy can safely be performed—even sporadically—by surgeons well versed in adrenalectomy techniques for endocrine disorders and trained in endoscopic surgery.

**Key words:** Laparoscopy — Adrenalectomy — Pheochromocytoma — Endocrine disorders — Retroperitoneum

Almost all abdominal procedures have been attempted laparoscopically. Despite their retroperitoneal location, kidneys and adrenals have also been reached by the blitz of endoscopic surgery since 1992 [6]. However, adrenalectomy is

not a frequent operation. Therefore the newly developed laparoscopic approach is sporadically performed by surgeons dealing with endocrine disorders.

Since experience with endoscopic adrenalectomy is limited and long-term results are not yet available [3, 6, 7, 9, 12, 14], we conducted, within the framework of the "Belgian Group for Endoscopic Surgery (BGES)," a prospective multicentric study in order to assess the benefits and drawbacks of endoscopic adrenalectomy. The surgeons involved in this study were experienced in laparoscopic techniques and also familiar with the rules and potential drawbacks of open adrenal surgery for endocrine disorders.

### Materials and methods

#### Source of data

A checklist was sent to members of the BGES in order to collect data about videoendoscopic adrenalectomy performed by surgeons already experienced with laparoscopic surgical techniques and open adrenalectomy for endocrine disorders. The report form includes information on the patient's age, sex, and clinical features (preoperative risk factors, American Society of Anesthesiology clinical status classification, previous abdominal surgery, preoperative diagnosis of adrenal disease, blood pressure data, preoperative imaging techniques, patients' coexisting conditions, and preoperative pharmacological preparation). Data were also obtained concerning the elected surgical technique (i.e., laparoscopic, retroperitoneoscopic, or both), operation duration, transfusion requirement, morbidity, anesthesiology considerations, pathological results, hospital stay, and follow-up.

#### Validation

Data were acquired from five surgical teams. All cases were operated on between October 1993 and December 1996. The database was managed by project coordinators designated by the board of the BGES.

### Results

There were 34 women and 18 men with a median age of 44 years (range 12–74). Of the 54 adrenalectomies performed,

**Table 1.** Indications for endoscopic adrenalectomy

Indication	No. of patients
Pheochromocytoma	17
Hyperaldosteronism	15
Cushing's adenoma	5
Cushing's disease (bilateral)	2
DHEAS and cortisol hypersecretion	3
Metastasis	2
Nonfunctional adenoma	7
ACTH-secreting metastases of thymoma (bilateral)	1
Total	52

31 were of the left gland, 19 of the right, and two bilateral. Table 1 gives the indications for videoendoscopic adrenalectomy. Twenty-five (48%) patients had undergone previous abdominal operation, and five patients with multiple endocrine neoplasia syndrome (four pheochromocytoma and one Cushing's disease) had previous contralateral adrenal surgery. Thirteen patients (25%) demonstrated a body mass index (weight in kilograms divided by height in meters squared) higher than 30, which means that they were regarded as being severely overweight [15]. The 52 patients presented a total of 94 coexisting clinical risk factors. Preoperative assignment risk according to the American Society of Anesthesiologists (ASA) physical status classification was as follows: ASA I (15 cases), ASA II (28 cases), ASA III (nine cases).

All 52 patients had their abdomen explored preoperatively by computed tomography (CT). Patients suspected of having pheochromocytoma also had metaiodobenzylguanidine (MIBG) scintigraphy. The initial endoscopic approach of the adrenal was transperitoneal in 49 patients (48 supracolic access and one transmesocolic access to the left adrenal) and retroperitoneal in three patients. Forty-nine patients were operated in the lateral decubitus position and three in the intermediate position. Endoscopic adrenalectomy was successful in 50 patients (96%). The two unsuccessful procedures involved bilateral procedures in one case for Cushing's disease and ACTH-secreting metastases from a malignant thymoma in another. Conversion was justified by bleeding in the first case and difficult endoscopic dissection in the second case. Two patients were initially operated on by a retroperitoneoscopic approach (one for primary hyperaldosteronism in the right adrenal ten years after right nephropexy and one for nonfunctional adenoma in the left adrenal) [1–3, 8, 10]. The upper pole of their kidney was entangled by adhesions. During dissection of these adhesions the peritoneal layer was slightly torn, allowing CO<sub>2</sub> to escape from the retroperitoneal space to the peritoneal cavity with the peritoneal layer falling on the endoscope. In fact, in these two cases the operation was easy to complete by the laparoscopic route because the retroperitoneum had already created a large retroperitoneal working space, rendering further exposure of the adrenal simple and rapid. A third patient was completely operated by the retroperitoneoscopic route.

Median tumor size was 4 cm (range 1.5–12). Median duration of procedure was 80 min (range 60–360). Median postoperative stay was 4 days (range 2–13). Postoperative complications were two pleural effusions and one basilaris artery thrombosis 2 weeks after surgery. One patient oper-

ated for a left pheochromocytoma and a 12-cm-diameter upper pole renal cyst had to be reoperated 12 h later for bleeding in the retroperitoneal space. Blood oozing was found and controlled laparoscopically. This patient was the only one who required blood transfusion.

Median length of follow-up was 9 months (2–38 months). One patient had a radical left nephrectomy because of lymph node recurrence in the hilum of the kidney from an adenocarcinoma of the lung. (Adrenalectomy had been performed 4 months before for a unique left adrenal metastasis from lung adenocarcinoma.) Another patient operated for a unilateral pheochromocytoma is demonstrating persistence of elevated blood pressure and abnormal catecholamine level, related to a contralateral adrenal hyperplasia, that was not demonstrated despite appropriate preoperative imaging techniques (i.e., CT scan and MIBG scintigraphy).

## Discussion

The actual results of the BGES multicentric study show that videoendoscopic surgery of the adrenal glands can safely be performed (success rate 96%). However, such procedures should be performed by surgeons who are already trained in videoendoscopic surgery and preferably well versed also in the techniques of open adrenalectomy for endocrine disorders. The actual results compared also favorably with a preliminary report on the first 16 patients from the BGES (success rate was 88%) [4].

Performance of endoscopic or open adrenalectomy for endocrine disorders, especially pheochromocytoma, requires a complete preoperative endocrine and hemodynamic workup. It also supposes close collaboration with the anesthesiology and endocrinology teams, as well as preparation of the patients, if indicated, with antihypertensive medications until the day of operation.

Modern imaging techniques, particularly CT scan, are reliable to precisely localize and define the adrenal lesions (i.e., unilateral or bilateral, lesion diameter, and extraadrenal pheochromocytoma). In this BGES experience all patients had a CT scan performed preoperatively. MIBG scintigraphy was also performed for patients suspected of having pheochromocytoma [13]. In fact, modern imaging instruments probably explore the adrenal and extraadrenal lesions more completely than the eyes and/or hands of the surgeon. Consequently, in many cases, the surgical approach can be direct and unilateral instead of what was the past practice—complete surgical exploration of the abdominal cavity, including visualization of both adrenal glands and surgical search for potential extraadrenal localization. A more selective approach elected on the basis of preoperative imaging techniques reduces the incidence of morbidity related to wide transperitoneal, retroperitoneal, or thoracoabdominal approaches. It is therefore reasonable to wonder whether the videoendoscopic approach could even further reduce the morbidity of adrenal surgery while increasing the comfort for the patients.

So far our results demonstrate that videoendoscopic adrenal surgery performed—even sporadically—by surgeons experienced in laparoscopic surgery is as safe as the open approach, provided those surgeons are also familiar with the rules and potential drawbacks of adrenal surgery.

The fact that only one patient required transfusion is an objective testimonial that the videoendoscopic approach meets several requisites for safety.

The value of removal of metastatic lesions within the adrenal gland is controversial. Despite the fact that in our early experience such metastatic lesions were removed, we think that this indication cannot be justified. The same restriction can be made for removal, whether endoscopically or by open surgery, of adrenal incidentalomas. In a recent study [11], criteria have been recommended for removal of adrenal incidentalomas at high risk for malignancy: (1) diameter larger than 4 cm or increase in size at any reevaluation; (2) CT-scan picture of intratumoral necrosis, hemorrhage, or irregular margins; and (3) high DHEAS levels. Adhering to these criteria allowed us to obtain a high incidence of clear-cut endocrine indications for adrenalectomy—i.e., pheochromocytoma, Conn and Cushing syndromes, and elevated DHEAS represent 81% of the case-load. The remaining 19% of rather debatable indications in the current series is low compared with other series [5].

Further studies are compulsory before any definite conclusion can be drawn concerning long-term results of videoendoscopic adrenalectomy and complete cure of endocrine disorders by this mini-invasive surgical approach. More comparative data are also required to conclude that endoscopic adrenalectomy allows decreased postoperative stay and/or reduced postoperative analgesic requirement. In this series, five patients presenting multiple endocrine neoplasia syndrome had sustained in the past a contralateral adrenalectomy by open surgery. Concerning postoperative pain, they acted as their own control and unanimously declared that the endoscopic approach was far more comfortable. On the other hand, postoperative stay longer than 1 week in these patients was related to the initiation of hormonal substitution treatment after bilateral adrenalectomy.

In conclusion, minimal access adrenalectomy does not mean minimization of surgical or anesthesiological risks. It may only portend better postoperative comfort for the patient if the videoendoscopic surgeon is competent and skillful enough to successfully complete the operation in a reasonable length of operative time.

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## Discussion

*Dr. Roll:* Which endoscopic approach do you think is easier—the transabdominal or retroperitoneal?

*Dr. Michel:* Well, actually the three first cases were done retroperitoneally, and I don't recommend that approach. The retroperitoneal approach doesn't improve the post operative recovery, but it does present more difficulties for the surgeon, at least I think so. Out of 52 cases 49 were done transperitoneally.

*Dr. Siperstein:* We've actually published a comparative series where we utilized both the lateral and retroperitoneal laparoscopic approach for dealing with tumors. Our current philosophy is that for small tumors, less than 4 cm, it is probably easier and faster to remove these via the retroperitoneal approach, given that you've had experience doing these procedures transabdominally before that.

*Dr. Michel:* I agree. The three cases we did retroperitoneally were for small lesions. However, when you have to deal with a big pheochromocytoma, I think you are better off using the transperitoneal approach. Anyway, if you start retroperitoneally and if you have any trouble, because, for instance, you tear the peritoneum, it's very easy to convert to a transperitoneal approach. You don't lose time. You don't have to change the position of the patient. All the work that has been done retroperitoneally will help you when you convert to a transperitoneal approach. For these three cases we established retroperitoneum by direct puncture without any control. Did you use ultrasonography to place the Veress needle in the retroperitoneal space?

*Dr. Siperstein:* Our technique for entering the retroperitoneal space, with the patient in the prone jackknife position is, to ultrasound through the back, to outline the kidneys position so we know the relationship of the Gerota's space to the twelfth rib, and then we use a direct viewing trocar, the so called Opti-View trocar, to enter Gerota's space under direct vision, and then with balloon dissection create that space. We found that to be a very safe and reproducible technique. I would not advocate entering that space with anything sharp.