



Posterior Retroperitoneoscopy as a New Minimally Invasive Approach for Adrenalectomy: Results of 30 Adrenalectomies in 27 Patients

Martin K. Walz, M.D.,¹ Klaus Peitgen, M.D.,¹ Rudolf Hoermann, M.D.,² Reiner M. Giebler, M.D.,³ Klaus Mann, M.D.,² Friedrich W. Eigler, M.D.¹

¹Department of General Surgery, Medical School, University of Essen, Hufelandstrasse 55, D-45122 Essen, Germany

²Department of Endocrinology, Medical School, University of Essen, Hufelandstrasse 55, D-45122 Essen, Germany

³Institute of Anesthesiology, Medical School, University of Essen, Hufelandstrasse 55, D-45122 Essen, Germany

Abstract. Posterior retroperitoneoscopic adrenalectomy is a new minimally invasive method. It represents an alternative to conventional open procedures and laparoscopic techniques. Between July 1994 and November 1995 a total of 30 retroperitoneoscopic adrenalectomies were performed on 27 patients. In 24 patients, unilateral tumors were seen (size 1–7 cm): seven Cushing adenomas, five Conn adenomas, seven pheochromocytomas, four hormonally inactive tumors, one cyst. Three patients suffered from Cushing syndrome with bilateral adrenal gland hyperplasias (two inoperable pituitary gland tumors, one bronchial carcinoid with ACTH secretion). The operations were carried out in prone position. After balloon dilatation of the retroperitoneum and creation of a pneumoperitoneum the preparation of the adrenal gland was performed via three trocar sites positioned below the 12th rib. Twenty-five adrenalectomies were completed endoscopically, and five times (among four patients) conversion to the conventional posterior technique was necessary. The average operating time of complete endoscopic adrenalectomies was 124 minutes (45–225 minutes); blood loss was 10 to 120 ml. With minimal need for postoperative analgesia (average dosage 7.9 mg of piritramide), mobilization and adequate food uptake were possible on the day of operation. The posterior retroperitoneoscopic adrenalectomy is a relatively fast, safe method, with the advantages of the posterior open approach and minimally invasive surgery. It therefore represents an important addition to adrenal gland surgery.

One of the main problems of adrenal gland surgery is the choice of operative approach. Attention must be directed especially toward the considerable discrepancy between the adrenal gland lesion and the necessary abdominal wall incision. Apart from the open transperitoneal and retroperitoneal approach, the laparoscopic adrenalectomy has been made use of due to rapid development of minimally invasive techniques. Undoubtedly, this method has advantages compared to the open procedure regarding postoperative pain and duration of hospitalization [1–3]. The large initial expenditure for this laparoscopic technique is difficult, and so it has been performed only in a few specialized clinics so far [1–10].

The posterior approach to the adrenal gland using balloon dilation is a novelty. This procedure combines the method of the open posterior approach with the technique of minimally invasive

surgery. Having described this technique recently [11], we now demonstrate the results of our first 30 adrenalectomies in 27 patients.

Patients and Methods

Patients

During the course of a prospective study, 30 posterior retroperitoneoscopic adrenalectomies were performed on 27 patients (7 males, 20 females, ages 10–75 years) between July 1994 and November 1995 (Table 1). In 24 patients the tumors of the adrenal gland were unilateral with a size of 1 to 7 cm. Thirteen of these tumors were localized to the right and eleven to left side. Additionally, three patients suffered from Cushing syndrome with bilateral hyperplasia of the adrenal gland cortex and unresectable ACTH-producing neoplasias (two pituitary gland tumors, one bronchial carcinoid). Hormonally inactive tumors were seen in five patients. One of these patients suffered from a peripheral adenocarcinoma of the lungs, and another had been diagnosed with breast cancer 6 years before. In these situations metastases were suspected. The indication for operation in the other three patients with hormonally inactive tumors was the increasing growth tendency of these tumors. To attain irreversible α -blockage, patients with pheochromocytoma ($n = 7$) were treated with an increasing dose of phenoxybenzamine (final dosage 3×50 mg until 3×90 mg) over a period of 14 to 21 days. All patients gave their written consent for this new type of operation.

For statistical analysis of the various postoperative requirements for analgesia the Mann and Whitney U test was used. Significance was accepted for $p < 0.05$.

Operative Technique

Since the first description [11] and due to increasing experience, we altered the retroperitoneoscopic adrenalectomy slightly. The current procedure is as follows.

Retroperitoneoscopic adrenalectomy is performed under gen-

Table 1. Characteristics of the first 27 patients undergoing posterior retroperitoneoscopic adrenalectomy.

No.	Age/sex	Diagnosis	Laterality	Tumor size (cm)	Duration of procedure (min)	Subtotal resection	Blood loss (ml)	Analgesic (pirtamide) postoperatively (mg)	Remarks
1	58F	Cushing adenoma	Left	3 × 3 × 2	205		100	22.5	
2	58F	Cushing adenoma	Left	3 × 2 × 2	75 ^c		NC	37.5 ^c	Conversion: cardiac output < 2l/min.
3	49F	Conn adenoma	Right	2 × 2 × 2	115		< 20	0	
4	46M	Cushing syndrome ^a	Bilateral	Hyperplasia	125R/135L		< 20	0	
5	37F	Cushing adenoma	Left	3 × 3 × 3	225		100	7.5	
6	42F	Conn adenoma	Left	1.5 × 1.5 × 1.0	155	+	< 20	0	
7	44M	Pheochromocytoma	Left	4 × 3 × 2	205		100	0	Pretreatment: 3 × 80 mg phenoxybenzamine
8	38F	Cushing adenoma	Right	4 × 4 × 3	150		< 20	30	Severe obesity (115 kg)
9	44M	Hormonally inactive adenoma	Left	3 × 2 × 2	135	+	40	15	Lung carcinoma
10	18F	Cushing syndrome ^a	Bilateral	Hyperplasia	100		20 (right side)	15 ^c	Conversion left side: skin emphysema
11	44M	Hormonally inactive adenoma	Right	4.5 × 4.0 × 4.0	130	+	< 20	15	
12	72F	Cushing adenoma	Right	4.5 × 4.0 × 4.0	125		120	15	
13	57F	Cushing adenoma	Right	5.5 × 4.5 × 4.0	110		80	7.5	
14	34M	Pheochromocytoma	Right	6.0 × 4.5 × 3.0	145		100	22.5	Pretreatment: 3 × 50 mg phenoxybenzamine
15	48F	Pheochromocytoma	Right	6 × 5 × 3	110		40	0	Pretreatment: 3 × 50 mg phenoxybenzamine
16	53M	Pheochromocytoma	Left	2.5 × 2.0 × 2.0	120		20	0	Pretreatment: 3 × 50 mg phenoxybenzamine
17	65F	Cushing syndrome ^b	Bilateral	Hyperplasia	100R ^c /100L ^c		NC	37.5 ^c	Conversion both sides: difficult exposure
18	10F	Cyst (hormonally inactive)	Left	1.5 × 1.5 × 1.0	45	+	< 20	0	
19	34F	Cushing adenoma	Left	4 × 3 × 2	100		< 20	0	
20	45F	Conn adenoma	Left	2 × 2 × 2	80	+	< 20	7.5	
21	62F	Hormonally inactive adenoma	Right	3 × 2 × 2	120 ^c		NC	45 ^c	Breast carcinoma conversion: gas loss
22	62F	Conn adenoma	Left	1 × 1 × 1	90		< 20	7.5	
23	43F	Pheochromocytoma	Right	7 × 7 × 4	200		50	0	Pretreatment: 3 × 90 mg phenoxybenzamine
24	75F	Hormonally inactive adenoma	Right	4 × 3 × 2	45		< 20	7.5	
25	41F	Conn adenoma	Right	3 × 2 × 2	70		< 20	0	
26	57F	Pheochromocytoma	Right	3.5 × 3.0 × 2.0	75		< 20	15	Pretreatment: 3 × 80 mg phenoxybenzamine
27	59M	Pheochromocytoma	Right	4.5 × 4.0 × 3.0	120		50	7.5	Pretreatment: 3 × 70 mg phenoxybenzamine

NC: not calculated.

^aUnresectable pituitary tumor.^bUnresectable, metastasized ACTH-secreting lung carcinoid.^cConversion to conventional posterior adrenalectomy.

eral anesthesia. For monitoring, a central venous catheter, an arterial catheter, and a balloon-tipped thermodilution catheter are used [12]. Additionally a nasogastric tube and a Foley bladder catheter are applied.

The procedure is performed with the patient in prone position and with moderately bent hip joints. The patient is positioned on

mattresses that allow inclination of the abdomen. Initially, a 1.5 cm transverse incision just below the tip of the 12th rib is performed. After having prepared the subcutaneous and muscle layer by sharp and blunt dissection, the retroperitoneal layer is easily accessible by digital perforation of the dorsolumbar fascia (Gerota's fascia). A small cavity is prepared digitally for balloon

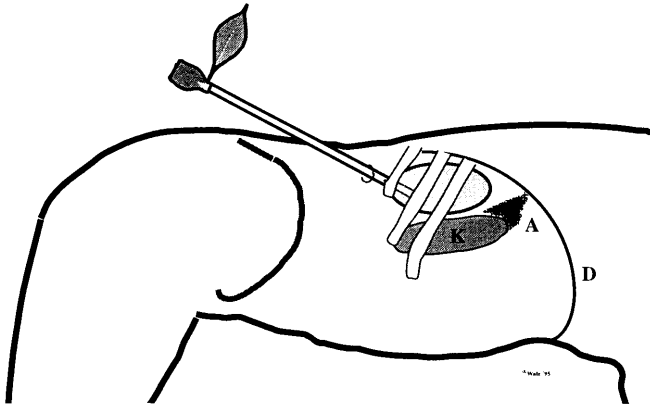


Fig. 1. Posterior retroperitoneoscopic adrenalectomy (lateral view): retroperitoneal balloon dilation. The incision is made below the 12th rib. D: diaphragm; A: adrenal gland.

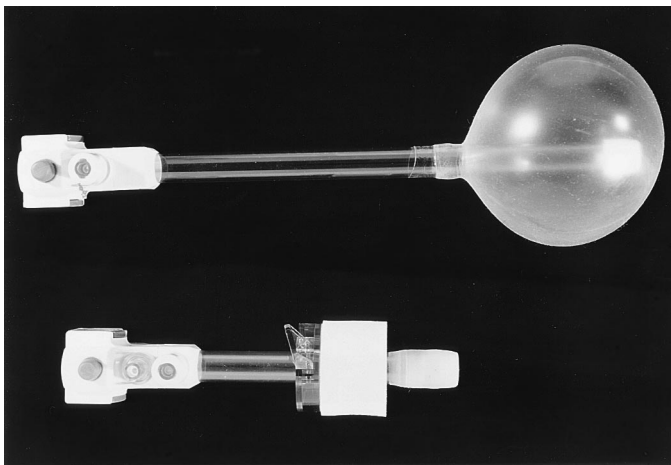


Fig. 2. Special trocars for posterior retroperitoneoscopic adrenalectomy: balloon trocar (top), blunt-tip trocar with an inflatable balloon and an adjustable sleeve (bottom).

dilatation with a special distension balloon trocar (PDB, 1000 Preperitoneal Distention Balloon System; Origin, Menlo Park, CA, USA), which is insufflated under endoscopic control for a few minutes to 6 to 8 cm in diameter ventral to Gerota's fascia (Figs. 1, 2). After removing the distension trocar, the resulting cavity is palpated digitally, and two 5 mm standard trocars are introduced with internal finger guidance 4 to 5 cm laterally (medioaxillary line) and medially (next to the sacrospinal muscles) to the initial incision site. Thus safe trocar placement is possible without visual control. Finally, a blunt trocar with an inflatable balloon and an adjustable sleeve (e.g., T10BT; Origin) is introduced into the initial incision site and blocked (Fig. 2). Thereafter a capnoretroperitoneum is created by maintaining a CO₂-pressure of 12 to 20 mmHg. Retroperitoneoscopy is performed, with a 5 mm 30 degree endoscope being introduced via the medial trocar (Fig. 3).

Preparation begins by pushing away the retroperitoneal fatty tissue in the vesselless layer from the fascia of Gerota ventrally. Within minutes a cavity is created, formed laterally, cranially, dorsally, and medially by parts of the diaphragm. Ventrally it is bordered by the retroperitoneal organs and the surrounding fatty

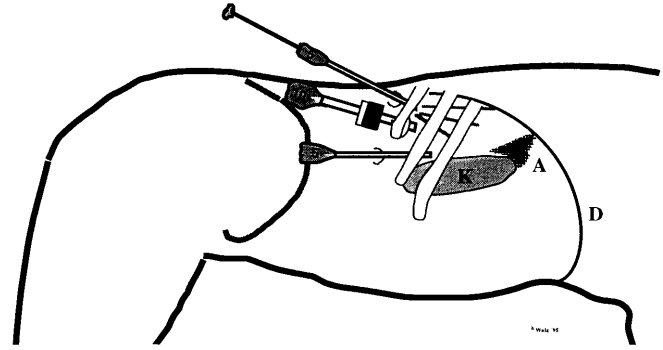


Fig. 3. Posterior retroperitoneoscopic adrenalectomy (lateral view). Three trocars (2 × 5 mm, 1 × 10 mm) are inserted below the 12th rib. D: diaphragm; A: adrenal gland.

tissue. Often the adrenal gland tumor can now be visualized. Mobilization of the adrenal gland with its tumor begins laterally in the usually poorly vascularized layer and is continued cranially to the angle between the diaphragm and the psoatic muscle. Here only small vessels are found, which can be separated by coagulation. All adrenal gland manipulations are performed bluntly using blunt palpation probes to prevent injuries to the adrenal gland tissue.

Preparation is continued medially between the diaphragmatic branch and adrenal gland. In this area on the *right side* the adrenal gland arteries cross the vena cava posteriorly. These vessels are separated by clips. During careful step by step preparation, keeping the adrenal gland held back laterally, the posterior surface of the caval vein can now be seen. The vena cava is demonstrated gradually in its retroperitoneal-cranial segment. Here the short suprarenal vein becomes clearly visible running posterolaterally. This vessel is followed to a length of 1 cm and separated between clips. Especially at this point an angled clip applicator has proved useful (e.g., AcuClip, Origin). The essential preparational steps of retroperitoneoscopic adrenalectomy are now completed. Having seen the upper kidney pole, the fatty tissue between kidney and adrenal gland can now be separated. Finally, the ventral adhesions of the adrenal gland and tumor are dissected from the peritoneum. In case of opening the peritoneum, the liver becomes visible on the right side and on the left the back of the stomach. The operation can be finished without having to suture the peritoneum.

The only difference for *left-sided* retroperitoneoscopic adrenalectomy are the steps at the adrenal gland vein. This vessel also runs in the space between the adrenal gland and the diaphragmatic branch caudally toward the kidney vein. During step-by-step preparation in this region the small adrenal gland arteries usually lie cranially and can either be separated between clips or coagulated. The aorta is covered by part of the diaphragmatic branch and is not visible. The left-sided adrenal gland vein lies caudally, medial to the upper kidney pole, and is comparatively long. Having clipped and separated it, the adrenal gland can then be fully mobilized in the same way as on the right side.

Occasionally a subtotal adrenal gland resection is indicated and possible, for example in cases of small, clearly identified, eccentrically lying tumors with little surrounding fatty tissue. For these resections facultative clip application to the resected area prevents bleeding.

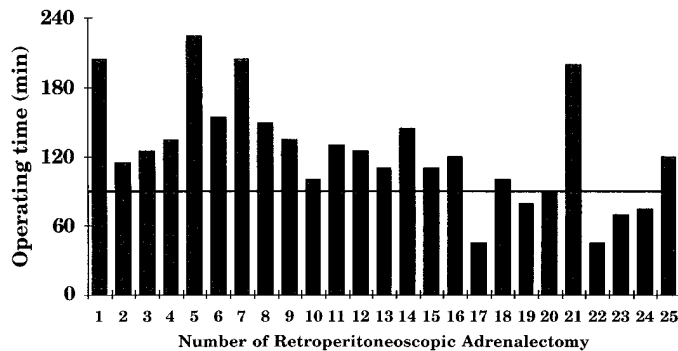


Fig. 4. Operating time ("learning curve") of the first 25 successful posterior retroperitoneoscopic adrenalectomies. Numbers 3 and 4 are the same patient (no. 4, Table 1). Horizontal line is drawn at 90 minutes.

Extraction of the completely mobilized adrenal gland tumor is performed through the middle incision with a retrieval bag system (e.g., Endocatch, USSC Norwalk, CT, USA). Depending on the tumor size, the incision site occasionally must be enlarged. Skin and fascia closure are performed after the optional drain insertion with reabsorbable materials.

Results

Of the first 30 retroperitoneoscopic adrenalectomies, 25 were performed entirely endoscopically. Reasons for converting to the conventional posterior operating technique were present five times in four patients: In a 59-year-old woman (case 2) with a left-sided Cushing's adenoma, a decrease in cardiac output to 1.7 L/min led to the conversion of the faster conventional posterior technique, widening the trocar incisions beforehand. In another case the right adrenal gland of an 18-year-old patient with an inoperable tumor of the pituitary gland (case 10) could be removed without problem. Yet on the left side the operation had to be ended openly when a cutaneous emphysema due to a trocar defect suddenly appeared after separation of the adrenal gland vein. In a large patient with bilateral hyperplasia of the adrenal gland cortices and bronchial carcinoid (case 17), a conversion was necessary on both sides. After separating the adrenal gland veins, exposure difficulties made complete extirpation of the adrenal glands impossible. Finally, conversion to the conventional technique was required in another patient (case 21) owing to technical problems (loss of gas).

Operating time for the 25 completely endoscopically extirpated adrenal glands (14 right, 11 left) was 45 to 225 minutes (mean \pm SD: 124 ± 49 minutes) with hardly any difference noted between the operated sides (right 116 ± 38 minutes; left 136 ± 57 minutes). Figure 4 demonstrates the learning curve: six of the last ten operations were performed in less than 1.5 hours. Intraoperative blood loss was 10 to 120 ml (mean 40 ml), and blood substitution was not necessary. Drainage of the retroperitoneal cavity was carried out seven times. Systolic blood pressures of more than 160 mmHg did not occur during the endoscopic procedure in any of the patients with pheochromocytoma (cases 8, 14–16, 23, 26, 27). Except for case 2, all other patients maintained stable circulation during the retroperitoneoscopic operation [12].

The postoperative course was uneventful in all endoscopically operated patients. Mobilization and food uptake could be com-

menced on the day of operation. All wounds healed with good cosmetic results. The postoperative requirement for analgesia was minimal after completely endoscopically operated patients; 10 patients had no need for analgesia at all after the operation, the other 13 patients received analgesia only for the first 24 postoperative hours (7.5–30.0 mg piritramide). The average amount of required analgesia was 7.9 mg piritramide. Among the patients converted to the conventional posterior technique, the average postoperative amount of analgesia was significantly increased (33.8 versus 7.9 mg piritramide, $p < 0.01$). The only postoperative complications were two temporary hypesthesias of the abdominal skin, which resolved completely after 2 and 3 months, respectively.

Blood analyses of patients with hormonally active tumors or ACTH-induced Cushing syndromes showed endocrinologic equilibrium postoperatively, thereby confirming the operative success.

Discussion

The hidden position of the adrenal gland in the cranial retroperitoneum makes the operative approach difficult. The conventional transperitoneal method, as with the extraperitoneal approach (posterior or lateral-lumbal), requires a relatively large incision. Therefore both classic approaches result in considerable postoperative pain. During recent years the posterior approach has become standard for small adrenal gland neoplasias. Compared to the transperitoneal operation, important advantages, such as operating time, blood loss, and the duration of postoperative convalescence, are achieved [13, 14].

During the course of the rapid developments in laparoscopic surgery, laparoscopic preparation of the adrenal glands has been advocated by some groups [1–8, 10, 15–17]. All authors uniformly describe minimal postoperative pain and rapid mobilization, as well as the short duration of hospitalization [1, 2, 5, 6, 8, 10, 15]. One of the main goals of minimally invasive surgery is an operating time comparable to that of open surgery. This aim has not been achieved by laparoscopic adrenalectomy owing to the need for the preparation of intraabdominal organs. Most of the authors report an average operating time of about 3 hours or even more for laparoscopic adrenalectomy (Table 2) [1, 3, 4, 6–9]; single cases of up to 9 hours have been reported [1, 8]. Only Gagner et al. [5], Guazzoni et al. [2], and Stuart et al. [10] have mentioned shorter operating times still being a disadvantage over conventional posterior procedures [3, 18]. The sometimes awkward and time-consuming preparation for laparoscopic transabdominal adrenalectomy can also be seen in the need for the four to six trocar sites (Table 2). Regarding operating time, laparoscopic adrenalectomy seems long and rather complicated with respect to the number of trocars.

Our results from the first 27 patients and 30 posterior retroperitoneoscopic adrenalectomies prove that this method has advantages compared to the laparoscopic procedure. The average operating time for our first completely retroperitoneoscopic adrenalectomies was about 2 hours, even though this method had to be newly developed. The adrenal gland preparation is easier retroperitoneoscopically, as intraabdominal organs have to be neither demonstrated nor held aside. The procedure can take place exclusively extraperitoneally with direct access to the adrenal gland. The adrenalectomy takes place in an artificially created cavity, where complete mobilization of the adrenal gland and the neoplasia is possible by maintaining a steady gas pressure. Only

Table 2. Laparoscopic versus retroperitoneoscopic adrenalectomy: studies with more than five patients (1993–1995).

Author	Year	Adenalectomies (no.)	Conversions (no.)	Tumor diameter (cm)	Operating time (min)	Blood loss (ml)	Trocars (no.)	Position
Matsuda et al. [4]	1993	13	2	1–5	297 (161–415)	149 (20–870)	4	Lateral
Gagner et al. [5]	1993	25	1	1–15	138	ND	4	Lateral
Suzuki et al. [6]	1993	12	1	1–4	278 (182–470)	370 (60–2100)	5	Semilateral
Nies et al. [7]	1993	5	1	2–5	222 (135–360)	230 (50–800)	4 or 5	Supine
Naito et al. [1]	1994	6	—	2–4	230 (165–540)	200 (30–350)	5	Semilateral
Takeda et al. [8]	1994	17	—	ND	269 (140–572)	229 (50–920)	5 or 6	Semilateral
Ono et al. [9]	1994	5	—	1.5–4.5	199 (155–230)	70 (50–100)	5	Lateral
Prinz [3]	1995	10	1	3–8	212 (90–341)	228 (100–700)	4	Lateral
Guazzoni et al. [2]	1995	20	—	1.5–6.0	170 (100–375)	100 (0–300)	5	Lateral
Stuart et al. [10]	1995	14	1	ND	157 (110–210)	ND	5 or 6	Supine
This study	1995	30	5	1–7	124 (45–225)	40 (10–120)	3	Prone

ND: no data.

three trocars are necessary (two 5 mm, one 10 mm). With increasing experience the posterior retroperitoneoscopic adrenalectomy should routinely be completed within 60 to 90 minutes (Fig. 4), which would then equal the conventional posterior procedure [18]. The postoperative need for analgesia, the small amount of blood loss, and the possibility of early mobilization clearly show that the posterior retroperitoneoscopic adrenalectomy definitely combines the advantages of the open posterior technique with that of a minimally invasive method. The small amount of blood loss is due to the precise preparation in layers of poor vascularization, with no need for the use of additional and sophisticated instrumentation (ultrasonic aspirator, argon beam), as is required for laparoscopic adrenalectomy [8].

Due to the excellent close-up view of the organs, retroperitoneoscopic adrenalectomy makes subtotal adrenal gland resection possible in suitable situations, such as for small, eccentrically localized tumors. Even though up to now such resections have only been described and accepted in cases of bilateral pheochromocytomas (as seen in the multiple endocrine neoplasia, or MEN, syndrome [19, 20]), our five cases show that endocrinologic cure can also be achieved with unilateral pheochromocytomas and Conn adenomas after careful selection. This function-preserving procedure should also be considered, as a high rate of these diseases are seen in young patients.

During recent times a number of authors have reported retroperitoneoscopic operating methods [11, 21–25]. The papers were either case reports [21–25] or descriptions of operating techniques [11]. Yet to date, clinical data of larger numbers are not available. It is remarkable that for retroperitoneoscopic adrenalectomy a *lateral* approach is described by most authors [22–25]. Apart from us, only Mandressi and coworkers chose the *posterior* approach [11, 21]. At the moment there is still some debate about the extent to which the posterior approach has more advantages over the lateral approach. Possibly the retroperitoneal endoscopic orientation is easier for the surgeon who in the past was used to the open posterior approach. Moreover, preparation of the short right-sided adrenal gland vein seems safer directly from behind, corresponding to its lateroposterior course. A two-sided operation without having to shift the patient is possible with the posterior approach.

The key to endoscopic retroperitoneal adrenalectomy is the initial retroperitoneoscopic balloon dilation. After digital preparation, the correct layer is automatically reached, which then allows safe trocar placement and swift exploration of the adrenal

gland. Complex procedures, such as creation of a pneumoperitoneum by screening with the aid of a Veress needle after demonstration of the ureters with contrast medium [21], can then be avoided.

In comparison to laparoscopic adrenalectomy, the retroperitoneoscopic method does not allow intraabdominal exploration and therefore no further laparoscopic operations on other organs or structures [5]. On the other hand, retroperitoneoscopic procedures are without problems after previous intraabdominal surgery. A disadvantage of the posterior method is the relatively small space available for preparation, and therefore it is limited to removal of small adrenal gland tumors (≤ 5 cm). On the other hand, the risk for malignancy increases remarkably in tumors > 5 cm [26], so with these tumors the conventional transperitoneal approach, instead of the endoscopic approach, is preferred.

Using the posterior retroperitoneoscopic adrenalectomy, conversion to the conventional posterior technique should be undertaken when patient-related, technical, or preparational problems arise. At the same time the trocar incisions can then be connected. Operating times of more than 3 to 4 hours for adrenalectomy to remove tumors of 2 to 5 cm is not acceptable, particularly as the posterior approach is also relatively gentle and fast [13, 18].

The posterior retroperitoneoscopic adrenalectomy is a new minimally invasive operating method. Preparation takes place directly toward the adrenal gland. Small, benign neoplasias can be extirpated rapidly, with little blood loss and minimal postoperative pain. The posterior retroperitoneoscopic adrenalectomy is a valuable addition to adrenal gland surgery.

Résumé

La adrenalectomie postérieure par voie «rétropéritonéoscopique» est une nouvelle méthode mini-invasive. Elle représente une alternative aux autres procédés traditionnels et laparoscopiques. Entre Juillet 1994 et Novembre 1995, 30 adrénaléctomies rétropéritonéoscopiques ont été réalisées chez 27 patients. Chez 24 patients, les tumeurs étaient unilatérales (taille de 1–7 cm) et comprenaient sept adénomes de Cushing, cinq adénomes de Conn, sept phéochromocytomes, quatre tumeurs inactifs du point de vue hormonal et un kyste. Trois patients avaient un syndrome de Cushing par hyperplasie bilatérale (deux en rapport avec des tumeurs hypophysaires inopérables, un du à un syndrome paranéoplasique secondaire à une tumeur carcinoïde bronchopulmonaire). Les interventions ont été réalisées sur le patient allongé en position

ventral. L'espace rétropéritonéal a été dilaté par un ballon, le rétropneumopéritoine a été ensuite créé par le placement l'intermédiaire de trois trocars situés sous la 12^e côte. Vingt-cinq surrénalectomies ont été réalisées complètement par voie endoscopique. Dans cinq cas (chez quatre patients), une conversion s'est révélée nécessaire. La durée moyenne du temps opératoire a été de 124 (45–225) min, les pertes sanguines ont été de 10–120 ml. Les besoins moyens en analgésiques ont été de 7.9 mg de piritramide et les patients ont pu déambuler et s'alimenter le jour même de leur intervention. L'approche postérieure est sûre et rapide. La méthode présentée unit les avantages de l'approche postérieure classique et celles de la chirurgie mini-invasive. Comme telle, elle représente un réel progrès en matière de chirurgie de la surrénale.

Resumen

La adrenalectomía retroperitoneoscópica posterior es un nuevo método quirúrgico mínimamente invasor. Representa una alternativa a los procedimientos convencionales abiertos y a las técnicas laparoscópicas. Entre julio 1994 y noviembre 1995 se practicaron 30 adrenalectomías retroperitoneoscópicas en 27 pacientes. En 24 se hallaron tumores unilaterales (tamaño: 1–7 cm; 7 adenomas de Cushing, 5 adenomas de Conn, 7 feocromocitomas, 4 tumores hormonalmente inactivos, 1 quiste). Tres pacientes padecían síndrome de Cushing con hiperplasia glandular bilateral (dos tumores pituitarios inoperables, un carcinoma bronquial con secreción de ACTH). Las operaciones fueron realizadas con el paciente en posición prona. Luego de dilatación con balón del retroperitoneo y de la creación de un neumoperitoneo, se hizo la preparación de la glándula suprarrenal por vía de tres trócares colocados por debajo de la 12^a costilla. Se completaron 25 adrenalectomías por vía endoscópica y en 5 casos (4 pacientes) fue necesaria la conversión a la técnica posterior convencional. El tiempo operatorio promedio de las adrenalectomías endoscópicas fue de 124 min (45–225) y la pérdida de sangre fue de 10–120 ml. Con mínimo requerimiento de analgesia postoperatoria, se logró la movilización y adecuada ingesta oral en el mismo día de la operación. La adrenalectomía posterior es un método relativamente rápido y seguro, el cual hace uso de las ventajas del abordaje posterior abierto y de la cirugía mínimamente invasora y, por consiguiente, representa un importante avance en la cirugía de la glándula suprarrenal.

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