

Laparoscopic adrenalectomy

Initial experience of 57 cases



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Laparoscopic adrenalectomy. Initial experience of 57 cases

AIM: *Analyse the results after 8 years of experience in the laparoscopic treatment of adrenal surgical pathology.*

MATERIAL OF STUDY: *This is a descriptive retrospective observational study. We analysed the following variables: sex, age, preoperative diagnosis, lesion size (cm) and laterality, operative time series (minutes), conversion to open surgery (%), postoperative complications, average length of hospital stay (days) and the results of pathological anatomy.*

RESULTS: *Fiftyseven laparoscopic adrenalectomy in 56 patients operated between May 2003 and September 2010. The average age of patients was 51.2 years (± 17.12). 50% of laparoscopic transperitoneal surrenalectomy was performed on male patients. The pathologic diagnosis of lesions were 25 cortical adenoma (44%), 16 pheochromocytomas (28%), 4 nodular hyperplasia (7%), 6 metastases of carcinoma of the lung (10%) and 2 metastatic malignant histiocytomas (5%), 2 ganglioneuromas (5%) and 2 myelolipomas (5%).*

DISCUSSION: *In light of the results obtained in large published series²⁻⁸, laparoscopic adrenalectomy has become the treatment of choice for tumours of the adrenal gland, fulfilling the goals of traditional surgery with the advantages of minimally invasive surgery. Several studies have highlighted the advantages of laparoscopic surgery compared to open surgery.*

CONCLUSIONS: *Laparoscopic adrenalectomy has proved to be the gold standard in the treatment of benign tumours and, is taking hold in the case of well-selected malignant tumours and in strict accordance with the criteria that should guide any surgical oncology.*

KEY WORDS: Adrenal Gland neoplasm, Laparoscopic adrenalectomy, Surgical procedure in adrenal pathology.

Introduction

Since the first description of Gargner in 1992 the laparoscopic approach in surgery of the adrenal glands is converted in the gold standard for treatment of adrenal

tumors¹. Proper patient selection is crucial in obtaining a higher success rate in laparoscopic surgery. Laparoscopic adrenalectomy is indicated in benign adrenal disease, which includes functional adrenal masses (pheochromocytoma, Cushing syndrome, hyperaldosteronism) and non-functioning masses or incidentalomas with a diameter of between 4 cm and 12 cm. The only absolute contraindication is in adrenal malignant disease. In the case of adrenal metastasis, the indication for laparoscopic surgery is controversial, although it has proven to be safe in selected cases.

The benefits of minimally invasive surgery compared to open surgery are clearly evident. From the surgical point of view provides an excellent surgical access and care from the point of view allows a reduction of hospital

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stay, reduced morbidity, postoperative pain and a minimal incision.

The retroperitoneal location of the adrenal glands allows a transabdominal or a transperitoneal approach. The choice between these two types of approach will depend on the surgeon experience because there is not evidence that the procedure is better than the other one.

OBJECTIVE

Analyse the results after 8 years of experience in the laparoscopic treatment of adrenal surgical pathology.

Material and Method

This is a descriptive retrospective observational study of 57 laparoscopic adrenalectomy in 56 patients operated on between May 2003 and September 2010. All patients were included in the analysis.

We analysed the following variables: sex, age, preoperative diagnosis, lesion size (cm) and laterality of the lesion, operative time series (minutes), conversion to open surgery (%), postoperative complications, average length of hospital stay (days) and the results of pathological anatomy. The series was divided into two groups, with reference to two periods: the first group from the beginning of the technique in may 2003 to the end of 2007 and the second group from january 2008 to september 2010, using the surgical time as a measure to evaluate the improvement in the ability of the surgical technique. All patients signed the informed consent. All procedures were realized under general anaesthesia.

Thromboprophylaxis was administered as low molecular weight heparin. Antibiotic prophylaxis was not used due to consider this surgery as a clean one. All patients were studied under the hormonal profile. The preoperative treatment is individualized for each patient. The patients with pheochromocytoma are preferentially treated with alpha-blockers (phenoxybenzamine) and in some case with calcium antagonists (Nifedipino). The addition of beta-blocker (propanol) was necessary only in the presence of tachycardia. Patients with primary hyperaldosteronism (Conn's syndrome) were administered treatment with potassium-sparing diuretics. In patients with hypercortisolism Ketoconazol was not necessary.

SURGICAL TECHNIQUE

Laparoscopic optic 0° and 30°, normal laparoscopic forceps, monopolar scalpels and harmonic scalpel (Ultracision®, Ethicon Inc., USA) were used indiscriminately. The pneumoperitoneum was realized systematically using a Verres needle and access was transperitoneal, operating with an intra-abdominal pressure of 12 mmHg. The position of the patients varied depending on the location of the lesion. If the lesion was in the right side, the patient was placed in the supine position,

using 4 trocars access, while for the lesions of the left side the patient in right lateral recumbency using 3 trocars access. The surgical technique was based on the location and subsequent ligation of the vascular pedicle by Endoclip, mobilizing the affected adrenal gland. In the right side lesion we used the triangular device Diamond-Flex® (Snowden-Pencer, Tucker, GA) to expose the adrenal vein and inferior vena cava. In the left side we expose the gland medially displacing the spleen, dissecting the splenic ligament and the left adrenal vein without getting to see the renal vein. In cases of adrenal metastases, where the periglandular fat tissue usually presents oedematous aspect or pseudo-inflammatory aspect, we used the harmonic scalpel to avoid injury to the gland. The removal of the adrenal gland was accomplished using endoscopic bag.

STATISTICAL ANALYSIS

The quantitative variables are expressed as mean, percentage and rank.

The qualitative variables were analysed by the comparison between the means using the T-Student Test and considered as a statistically significant $p < 0.05$.

Results

The average age of patients was 51.2 years (± 17.12). The 50% of laparoscopic transperitoneal adrenalectomy was performed on male patients. In 56% the location was right and left in 44%. In one patient a bilateral adrenalectomy was accomplished in two different surgical times. Surgery was indicated in 34 cases (59%) for hormone secreting lesions, of these 16 patients were Pheochromocytoma (28%), 11 Cushing's syndrome (19%) and 7 Conn's syndrome (12%). In 23 cases (41%) surgery was indicated for not working masses, of which 17 were non-functioning Incidentaloma (30%) and 6 (10%) patients who presented metastatic disease. The average size of the lesions was of 3.83 cm (1-10 cm).

The average time the operating of the whole series was of 131 ± 57 minutes, lower in the right adrenalectomy 127 ± 53 minutes, while in the left adrenalectomy 136 ± 63 minutes. The average operative time was influenced by the size of the adrenal mass and the improvement of technical skills. The mean operative time of 120 ± 15 minutes was obtained in masses with a size less than 4.5 cm, compared to an average of 190 ± 40 minutes in masses which presented a diameter greater than 6 cm. Two groups of patients with similar lesions were compared, in the first group [2003-2007, $n = 26$ (45%), average size of the mass: 3.76 cm] the mean operative time was 162 ± 70 minutes, while in the second group [2008-2010, $n = 31$ (55%), average size of the mass was 3.87 cm] the mean operative time was 105 ± 23 minutes, statistically significant differences.

Bilateral adrenalectomy were not performed in the same surgical time. Conversion to open surgery was achieved in 2 patients (3.5%), both were right adrenal masses larger than 8 cm, and the reason that led to the conversion was intraoperative bleeding due to an inadequate vision of the surgical dissection. Two cases (3.5%) presented intraoperative complications due to liver lacerations caused by the use of a laparoscopic separator. Both cases were solved in the same operative time without the need to conversion to open surgery.

No patient with Pheochromocytoma presented hemodynamic changes during production of the pneumoperitoneum or during the surgical dissection. The mean blood loss was 50 cc. Intracorporeal drainage were used in 8 cases and in all cases were withdrawn during the first postoperative 12 - 24 hours. In all cases the bladder probe and the nasogastric probe were withdrawn at the end of surgery. Postoperatively only one patient (1.7%) presented a pneumonia. The mortality rate was 0%. The re operation rate was 0%. The beginning of oral diet was an average of 0.94 days (1-4). Non steroidal anti inflammatory drugs were used as postoperative analgesia with an average of 5 doses (3-12 doses). The average hospital stay was of 3.3 days (1.5-12). During the follow-up only one tumour recurrence was detected in patient operated for metastases disease.

The pathologic diagnosis of the removed lesions were 25 (44%) cortical adenoma, 16 (28%) pheochromocytomas, 4 (7%) nodular hyperplasia, 6 (10%) metastases of breast cancer and 2 (5%) metastatic malignant histiocytomas, 2 (5%) ganglioneuromas and 2 (5%) myelolipomas.

Discussion

In light of the results obtained in large published series²⁻⁸, laparoscopic adrenalectomy has become the treatment of choice for tumours of the adrenal gland, fulfilling the goals of traditional surgery with the advantages of minimally invasive surgery. Several studies have highlighted the advantages of laparoscopic surgery compared to open surgery (less pain, reduced hospital stay, better cosmetic results and faster integration into the work)⁹⁻¹³.

Although in the international literature the main indication of laparoscopic adrenalectomy is for primary aldosteronism, in our series was for pheochromocytoma (28%), followed by incidentaloma (26%) and Cushing's syndrome (19%). In our opinion, the advantages of laparoscopic surgery have led to the current tendency to operate more incidentalomas, increasing the prevalence of this kind of surgical pathology and making this the most frequent cause of adrenalectomy.

Our criteria to indicate a laparoscopic adrenalectomy in a benign mass are the size equal to or less than 10

cm, without sign of a active bleeding in case of hemorrhagic adrenal pseudocyst¹⁴. However, recent studies have shown that the laparoscopic adrenalectomy is a valid treatment in larger tumours^{15,16}.

Although there is not a consensus to accept the laparoscopic approach for resection of isolated adrenal metastases, there is scientific evidence to indicate a resection without affecting the adrenal gland, as long as the surgical team has sufficient experience^{17,18}.

The local recurrence during follow-up of our patient might be due to the biology of the tumour itself or tearing of the capsule of the gland during surgery. Faced with this possibility we consider that the conversion to surgery is needed in such evenience to ensure complete resection of the metastatic gland.

The approach chosen in our series was the transperitoneal, by varying the position of the patient based on the affected side. We have no experience in other types of laparoscopic access as retroperitoneal¹⁹ and even in NOTES²⁰ as other authors have published with good results.

The position and the number of trocars used in the right adrenalectomy is similar to that described by other authors, while in the left adrenalectomy we used only 3 trocars, because of the systematic medially dislocation of the spleen, allowing a wide exposure of the adrenal area, avoiding the use of laparoscopic retractors^{21,22}.

As in other laparoscopic procedures, the learning curve is demanding, especially in left adrenalectomy, because it requires more extensive dissection to obtain better exposure of the vascular pedicle. The operative time decreased with increasing number of cases treated and analysing the data obtained in our series, 15-20 cases are required to obtain adequate surgical performance. Proposed data are very similar to other published series^{23,24}.

The adrenergic block in pheochromocytoma can avoid intraoperative hypertensive crisis²⁵. There were no hemodynamic changes during production of pneumoperitoneum or during surgical dissection of the mass²⁵. All patients had preoperative adequate control of blood pressure. The majority of patients were treated with phenoxybenzamine, with different doses, 20 mg/24 h and 130 mg/24 h, Nifedipino was used in a small number of patients. There were no differences between these two groups in blood pressure control during surgery or as intraoperative complications. Recent experience suggests that there is no significant difference in episodes of hemodynamic instability in patients undergoing open surgery compared to laparoscopic surgery¹².

Patients with Cushing's syndrome generally have a higher percentage of visceral fat and this may present difficulties in both the exposure of the surgical field.

Patients with primary aldosteronism are an ideal indication for laparoscopic adrenalectomy, as they are generally small tumours with low malignant potential and no risk of hypertensive crisis^{7,21,26}.

There is no scientific consensus for the malignant adrenal tumour²⁷. The role of surgery is very important, not

only for the malignant adrenal tumor, but also for metastases in the adrenal glands²⁸. Although it could be treated with laparoscopic approach to the principles of oncological surgery, this kind of disease requires a highly selective indication. Large tumours may impede intraoperative management, increasing the risk of tearing the capsular and intra-abdominal tumour spread wide. The characteristics of these masses require longer operative times and higher conversion rates. Although the laparoscopic approach is contraindicated in the presence of local infiltration or tumours greater than 12 cm, the use of hand-port could be considered as an alternative approach to open surgery²⁹.

In a literature review on laparoscopic adrenalectomy were analysed 2550 cases, the average rate of complications (including benign and malignant lesions) was 9.5% (range 3-20%), the average conversion was 3.6% (0-12%) and the average mortality rate was 0.2% (from 0 to 1.2%)³⁰. In our series, the mortality rate, the conversion rate and the rate of minor complications presented similar results to those published in the literature. The benefit of laparoscopic surgery in terms of hospital stay, post-operative pain and faster return to work has been widely demonstrated in numerous series.

Conclusions

Laparoscopic adrenalectomy has proved to be the gold standard in the treatment of benign tumours and is taking hold in the case of well-selected malignant tumours and in strict accordance with the criteria that should guide any surgical oncology.

The advantages of this technique are probably superior to those achieved in other laparoscopic procedures compared to open surgery, primarily because of the anatomical location of the adrenal glands. The data presented confirm the reproducibility of the surgical technique and improvement of skills acquisition necessary if you make a minimum number of cases needed to acquire the necessary experience, although this assertion has yet to be confirmed with a larger number of cases.

Riassunto

SCOPO: Analizzare i risultati dopo 8 anni di esperienza nel trattamento laparoscopico della patologia chirurgica delle ghiandole surrenali;

MATERIALE E METODO: Studio descrittivo osservazionale retrospettivo. Abbiamo analizzato le seguenti variabili: sesso, età, diagnosi pre-operatoria, dimensione (cm) e lateralità della lesione, tempo operatorio (minuti), la conversione alla chirurgia aperta (%), le complicanze post-operatorie, durata media della degenza ospedaliera (giorni) ed i risultati di anatomopatologici.

RISULTATI: 57 surrenectomie laparoscopiche in 56 pazien-

ti operati tra maggio 2003 e settembre 2010. L'età media dei pazienti fu di 51,2 anni ($\pm 17,12$). Il 50% dei pazienti furono di sesso maschile. Allo studio anatomopatologico delle lesioni rimosse riscontrammo 25 adenomi corticali (44%), 16 feocromocitoma (28%), 4 iperplasia nodulare (7%), 6 metastasi di carcinoma del polmone (10%) e 2 metastasi maligne di istiocitoma (5%), 2 ganglioneuromi (5%) e 2 mielolipomi (5%);

DISCUSSIONE: Alla luce dei risultati ottenuti in numerose casistiche²⁻⁸, la surrenectomia laparoscopica è diventata il trattamento di scelta per i tumori della ghiandola surrenale, unendo gli obiettivi della chirurgia tradizionale ai vantaggi della chirurgia mini-invasiva. Diversi studi hanno evidenziato i vantaggi della chirurgia laparoscopica rispetto alla chirurgia aperta.

CONCLUSIONI: La surrenectomia laparoscopica ha dimostrato di essere il gold standard nel trattamento di tumori benigni e, in casi ben selezionati e in stretta conformità con i criteri della chirurgia oncologica, sta prendendo piede anche in casi di tumori maligni.

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Commento - Commentary

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Sarebbe interessante conoscere, nell'esperienza degli Autori se l'estesa dissezione necessaria per l'esecuzione della adrenalectomia del lato sinistro abbia determinato successivi problemi della canalizzazione intestinale, oppure se a fine intervento laparoscopico si è adottato qualche provvedimento particolare per riposizionare milza, coda del pancreas e soprattutto angolo colico sinistro

* * *

It should be interesting to know, in the experience of the Authors, if the extended dissection needed in performing the left side adrenalectomy was followed by some disfunction of bowel motility in the follow up, or if at the end of the laparoscopic procedure some surgical measure was adopted to replace and fix pancreas tail with spleen, and above all the left colon corner.