

Our Experience Videoendoscopic Adrenalectomy in Patients with Benign Adrenal Tumors Large Sizes

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Abstract Presenting the results of laparoscopic adrenalectomy in 15 patients benign tumors of the adrenal glands that are larger than 5 cm. We compare the duration of operations, the frequency of complications and postoperative course. Also highlighted in particular surgical technique when performing these operations. A comparative analysis of the results in the study group and the control group, which accounted for 82 patients who underwent laparoscopic adrenalectomy at the size of the tumor less than 5 cm.

Keywords Benign adrenal tumors, Big size, Laparoscopic adrenalectomy

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1. Relevance

Currently, laparoscopic adrenalectomy (LAE) is the gold standard in patients with benign tumors of the adrenal glands. LAE has all the advantages of minimally invasive operations, and creates the opportunity to perform an adequate level of operation [1]. According to various authors, the main factor affecting the ability to perform LAE, is the size of a tumor of the adrenal gland. For several years, it was believed that a tumor of the adrenal gland that is larger than 5 cm, is a contraindication to perform LAE [2], establishes that the large size of the tumor followed by large anatomy changes in the adrenal gland, which leads to difficulties in the identification of anatomical structures. The value of this fact is reflected in increased incidence of perioperative complications and access conversion and increase in the critical time spent on performance of LAE [3]. And with an increase in the size of tumors of the adrenal glands, a regular increase in the probability of malignant process and was considered a contraindication to perform LAE [4].

However, recently put into practice a more informative diagnostic methods, such as CT and MRI, and it has greatly improved the topical diagnosis of adrenal tumors, which made it possible to specify before the operation idea of the features of the area of the adrenal gland and the opportunity to facilitate the identification of anatomical structures in during surgery [5, 6]. Another important aspect is the improvement of anesthesia, which allows for longer operation while maintaining the same level of safety of anesthesia for patients [7]. In view of the above points, there is evidence in the literature on the successful implementation of LAE with adrenal tumors larger than 5 cm. According to S.I. Emelyanov et al. LAE with adrenal tumors ranging in size from 51 to 87 mm, is the operation of choice in this group of patients subject to these requirements to the realization of the given intervention [8]. R. Sharma et al. [9] and G. Zografos et al. [10] reported the laparoscopic removal of adrenal tumors at a rate of 8-9 cm in 15 patients. According to other authors, the maximum size of an adrenal tumor, laparoscopic successful remote access up to 12 cm [11].

2. Objective

To study the possibility of laparoscopic adrenalectomy in patients with benign tumors of the adrenal glands in size greater than 5 cm.

3. Material and Methods

Our experience LAE with adrenal tumors is 97 operations. For the diagnosis of adrenal tumors was used complex laboratory and instrumental studies, including CT proved more informative. All patients were divided into 2 groups.

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Published online at <http://journal.sapub.org/ajmms>
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All patients were produced by LAE lateral transabdominal approach. Preference lateral transabdominal laparoscopic approach gave in connection with the fact that it best meets the criteria for evaluating the spatial surgical approaches. The first group included 15 patients who had an adrenal tumor size greater than 5 cm. Right side LAE was performed in 10 (66.6%) patients and left-sided LAE - 5 (33.3%). Diameters of remote tumors ranged from 51 to 98 mm with right LAE and 52 to 75 mm - in the left LAE. The average tumor size in this group was 71 ± 8 mm.

The second group consisted of 82 patients who had adrenal tumors smaller than 5 cm. In this group right-sided tumor was detected in 37 (45.1%) patients, and left-sided - in 45 (54.9%) patients. The average size of the tumor in the second group was 34 ± 11 mm.

By morphological character of tumor patients were divided as follows: a mixed structure adenoma - 5 and 43, aldosteronoma - 3 and 13, pheochromocytoma - 3 and 3, nodular adrenocortical hyperplasia - 0 and 6 and adrenal cyst - 4 and 2, respectively.



Figure 1. Tumor of the right adrenal gland (pheochromocytoma) dimeters 77x52 mm



Figure 2. Tumor of the right adrenal gland (adenoma) dimensions 33x27 mm

Preoperative preparation of patients depended largely on the nature of the tumor, and the patient was placed on an operating table in the supine position on the side opposite to the side of the lesion. Pneumoperitoneum procedure was applied for the safe and the gas pressure in the peritoneal cavity does not exceed 10 mm Hg during surgery.

The main stages of the operation by increasing the adrenal tumor size remained the same and included the creation of the exposure of the surgical field, the central vein authentication, clipping and the intersection of the central vein, dissection of the adrenal gland in a single unit with tumor extraction macropreparations. All macropreparations (Fig. 1 and Fig. 2) after surgery is compulsory for histological examination.

When analyzing the results, we investigated the criteria for the duration of the operation as a whole and its individual stages (Table. 1), the frequency of intra- and postoperative complications, postoperative course indicators.

Table 1. The duration of the main stages of LAE on the adrenal tumors, depending on their size

№	Step operation	<5 cm	>5 cm
1	Creating the surgical field exposure	22,4±2,1	24,4±1,7
2	Identification of the central veins	16,1±2,2	24,0±2,4*
3	Clipping and the intersection of the central vein	16,4±1,8	17,5±1,1
4	The dissection of the adrenal gland tumor	15,5±2,9	23,7±2,3*
5	Extraction of the adrenal gland	18,3±2,1	25,7±2,1*
	The average duration of the entire operation, min	88,7±11,1	115,3±9,6*

*Reliability $p < 0,05$

On the presented data (Table. 1), the total duration of the operation in the first group more than 20% opposite to second group, with the main difference for the duration of phases occurred in identifying central vein, dissection and adrenal tumor macropreparations extraction from the abdominal cavity. In 5 cases to reduce the operation time (in particular the duration of steps 4 and 5), and reduce the amount of blood loss after clipping and crossing the central vein adrenal procedure we used "hand-assist". The average blood loss during surgery were 117 ± 38 ml and 67 ± 27 ml, respectively ($p < 0.05$). However, it should be noted that at the present level of anesthetic management is increasing the duration of surgery essentially no negative effect on the patient's condition.

Among our patients had not fatal outcomes. When analyzing the frequency of intraoperative complications, we found 2 (13.3%) complications in the first group, there are bleeding from the liver and reactive pancreatitis, in the second group revealed 3 (3.6%) complications - 1 retroperitoneal hematoma, 1 injured spleen, and in one the case of reactive pancreatitis. Bleeding from the liver

stopped using electrocautery, reactive pancreatitis and retroperitoneal hematoma successfully treated conservatively. And in one case we performed laparoscopic splenectomy. Access conversion not required in any of the observations in both groups. Case interoperative spleen injury in the first group was closely associated with tumor abutment and the difficulties of its dissection. Postoperatively, one patient after removal of a large tumor size (85 mm) in the expanded extraction macropreparations throw trocar access was found preperitoneal hematoma, which is successfully treated conservatively.

When comparing postoperative parameters revealed the following results: average time of activation of the patients was $9,3 \pm 3,1$ hours and $8,7 \pm 2,19$ hours; the average duration of pain was $21,4 \pm 5,9$ hours and $16,7 \pm 4,1$ hours (in both groups the use of narcotic analgesics is not required), the average time of hospital stay was $5,8 \pm 1,2$ days and $4,3 \pm 0,6$ days, the average duration of temporary disability of patients was $13,7 \pm 3,4$ days and $11,5 \pm 2,7$ hours, respectively ($p < 0.05$). Results show that only the average duration of pain and his character (in the first group were observed more severe pain) were significantly different in the groups, and between other parameters difference have not been observed.

And of course, despite a slight increase in the frequency of complications (in percentages), and a slight worsening of postoperative performance in comparison with the LAE on the size of adrenal tumors less than 5 cm, the immediate results of LAE with adrenal tumors larger than 5 cm far exceed the results of open surgery.

In the long term (1 year) in the study of the clinical effectiveness of the operation carried out, we found no recurrence of the disease in all of our patients, and the concentration of adrenal hormones in all cases did not exceed the normal range of.

Thus, LAE at adrenal benign tumors larger than 5 cm, is a fairly safe and effective intervention. However, for the success of such operations requires a high level of attention and the surgeon's experience, high quality preoperative topical diagnostic and anesthetic, as well as the appropriate level of hardware.

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