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## PRE- AND INTRAOPERATIVE MANAGEMENT OF PATIENTS WITH NEOPLASMS OF ADRENAL GLANDS

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**ПРЕ- И ИНТРАОПЕРАЦИОННЫЕ ВВЕДЕНИЯ  
БОЛЬНЫХ С НОВООБРАЗОВАНИЯМИ  
НАДПОЧЕЧНИКОВ**

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**БУЙРАК УСТИ БЕЗИ ХОСИЛАЛАРИ БЎЛГАН  
БЕМОРЛАРНИ АМАЛИЁТДАН ОЛДИНГИ ВА  
АМАЛИЁТ ИЧИ ДАВРИДА ОЛИБ БОРИШ**

**PRE- AND INTRAOPERATIVE MANAGEMENT OF PATIENTS  
WITH NEOPLASMS OF ADRENAL GLANDS**

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**АННОТАЦИЯ**

Оценка влияния дооперационного лечения на результаты видеоэндоскопической адrenaлэктомии у больных с опухолями надпочечников. в исследование включены 140 пациентов, у которых предпринята видеоэндоскопическая адrenaлэктомия (ВЭА), находившихся на лечении во 2-й клинике Ташкентской медицинской академии в 2009-2017 гг. Мужчин было 65, женщины – 75, возраст – от 14 до 72 лет. все оперативные вмешательства проводились под общей комбинированной многокомпонентной анестезией с интубацией трахеи и искусственной вентиляцией лёгких. Осложнений в послеоперационном периоде не наблюдалось. Сроки пребывания в клинике больных, перенесших боковую трансабдоминальную адrenaлэктомия, – 4,5 койко-дня, после задней забрюшинной адrenaлэктомии – 3,2 койко-дня. Летальных исходов после ВЭА не было. при опухолях надпочечников ВЭА является высокэффективным, малоинвазивным методом. При этом размер опухоли не должен превышать 10 см.

**АННОТАЦИЯ**

Буйрак усти беzi ўсмаларида видеоэндоскопик адrenaлэктомия натижаларида амалиётдан олдинги тайёргарлик таъсирини баҳолаш. Текирувуга Тошкент Тиббиёт Академияси 2- клиникасида 2009 йилдан 2017 йилгача видеоэндоскопик адrenaлэктомия (ВАЭ) (ретроперитонеал адrenaлэктомия (РПАЭ) ва лапароскопик адrenaлэктомия (ЛАЭ)) бажарилган 140 бемор қиртилган. Беморлар 65 эрак ва 75 аёллардан ташкил топган. Беморлар ёши 14 ёшдан 72 ёшгача (ўртача 42,3±3,4 ёш). Беморлар оғирлиги ўртача индекс 30,2 ни ташкил қилди. Ҳамма амалиётлар қўп компонентли комбинациялашган умумий анестезия билан трахея интубацияси ва сунъий ўпка вентиляцияси ёрдамида ўтказилди. Буйрак усти беzi ўсмаларида бажарилган 140 ВЭА ўзини юқори самарадорлиги ва кам инвазивлиги билан аҳамиятга эга. Бугунги кунда бу амалиётларни бажаришида ўсма ўлчами 10 см дан катта бўлиши керак эмас.

**ABSTRACT**

To assess the impact of preoperative treatment on the results of videoendoscopic adrenalectomy in patients with adrenal tumors. We included in the study 140 patients underwent videoendoscopic adrenalectomy (VEA) at the 2nd clinic of Tashkent Medical Academy between 2009-2017. Men were 65, women were 75, the age was from 14 to 72 years. All surgical interventions were performed under combined multicomponent anesthesia with intubation of the trachea and artificial ventilation of the lungs. There were no complications in the postoperative period. Duration of stay in the clinic of patients underwent lateral transabdominal adrenalectomy was 4.5 bed-days, after retroperitoneal adrenalectomy - 3.2 bed days. There were no lethal outcomes after VEA. Conclusions: VEA is a highly effective, minimally invasive method for tumors of the adrenal gland. In this case, the size of tumor should not exceed 10 cm.

**Relevance.** Medication correction of endocrine and metabolic disturbances of homeostasis with an existing adrenal tumor that causes hyperproduction of hormones is ineffective [1, 3,6,13]. Relations with what for today, a radical method of treatment of adrenal tumors is surgical. At the same time, the success of surgical intervention in adrenal tumors, both traditional and endovideosurgical, largely depends on the correctness of preoperative preparation, as well as anesthesia [2,4,8,15].

The basic principles of preoperative preparation in this category of patients are aimed at preventing hypertension in the first stage of the operation and hypotension - at the second stage, as well as preventing the manifestations of adrenal insufficiency in the postoperative period [9,10,14]. Preoperative preparation of patients with adrenal tumors is determined by the nature of their tumor lesion and the degree of homeostatic disorders caused by the underlying process, as well as by concomitant diseases [5,7,12].

In addition to all the above-mentioned problems, anesthesia for endoscopic surgery on the adrenal glands has additional features: a peculiar laying of the patient on the operating table, the specificity of the operative access and the technique of performing the intervention, which involves the injection of carbon dioxide under pressure into the abdominal cavity or retroperitoneal space [11, 12, 14].

Increased intra-abdominal pressure with carbon dioxide leads to the development of hypercapnia, hypoxemia, decreased venous return and cardiac output. In addition, the absorption of carbon dioxide by the peritoneum affects the state of the acid-base balance [3,4,11].

However, low-traumatic video endoscopic interventions, despite the available additional risk factors, makes them attractive not only for hormonally inactive adrenal tumors, but also for hormonally active tumors [7,10]. In this regard, preoperative preparation of patients with adrenal tumors, depending on its morphological type, is of particular importance.

**Purpose.** The purpose of this study was to evaluate the effect of preoperative treatment on the results of video endoscopic adrenalectomy in patients with adrenal tumors.

**Material and methods.** The study included 140 patients who underwent video endoscopic adrenalectomy (VEA) (retroperitoneal adrenalectomy (RPAE) and lateral transabdominal adrenalectomy (LTAAE)) to the vascular surgery department of the 2nd clinic of the Tashkent Medical Academy for the period from 2009 to 2017. The interventions were preceded by clinical and biochemical analyzes of blood and urine, the study of the level of adrenal and pituitary hormones, electrolyte blood composition, ultrasound, CT (in cases of arterial hypertension with contrasting renal arteries). Patients with a suspected malignancy of the tumor, as well as with a tumor size of more than 10 cm (excluding cysts), underwent open adrenalectomy and did not enter this analysis.

Of 140 patients, men were 65, women - 75. The age of patients ranged from 14 to 72 years (mean age was  $42.3 \pm 3.4$  years). The average body mass index was 30.2.

In addition to obesity, which was usually found in patients with Cushing syndrome, the following accompanying pathologies were identified: in 8 patients - chronic nephritis, 4 - chronic hepatitis, 3 - diabetes, 2 - chronic bronchitis, 2 - autoimmune thyroiditis, heart failure of 1-2 degrees, associated with arterial hypertension in 12 patients.

In 12 patients, concomitant pathologies were identified during the examination, requiring surgical correction. So, in 8 patients chronic calculus cholecystitis was found, in 2 - umbilical hernia, in 1 - nodular goiter and in 1 - no parasitic cyst of the liver.

The degree of anesthesia risk in the average ASA system was 2.5 (from 2 to 4).

The size of the tumor of the adrenal gland was from 1 to 10 cm (an average of 3.2 cm). At the same time, patients with a tumor size of no more than 6 cm were selected for RPAE.

To perform LTAAE, the patient was on the operating table in the supine position on the corresponding side, while the operating table was "broken" at the level of the waist at an angle of approximately 30 degrees.

To perform a RPAE, the patient was on the operating table in the supine position. At the same time his legs are bent in the hip and knee joints at an angle of 90 degrees.

In 47% of cases, adrenalectomy was performed to the right, 53% to the left.

In 21 (15%) cases, the tumor was hormonally inactive, and in the remaining 119 (85%) it was hormonally active (Table 1).

Table 1.

## Diagnosis of patients who underwent VEA, on the basis of hormonal research

Hormonal Diagnostics	LTAAE	RPAE	Total
Pheochromocytoma	10 (11,2%)	2 (4%)	12 (8,6%)
Conn's syndrome	28 (31,5%)	18 (35%)	46 (32,9%)
Cushing syndrome	40 (44,8%)	21 (41%)	61 (43,6%)
Incidentaloma	11 (12,5%)	10 (20%)	22 (15,9%)
Total	89	51	140 (100%)

Among patients with hormone-active adrenal tumor in 96 (80.7%), one of the complaints was an increase in blood pressure. The arterial hypertension was observed in them in terms of 3 months to 5-6 years. 41 (34.5%) patients, in addition, had various disorders of mineral metabolism.

Given these disorders, patients with tumors of the adrenal glands needed pre-operative preparation. The preoperative preparation of patients depended on the expected hormonal diagnosis.

**Conn's syndrome.** With Conn's syndrome, metabolic disturbances in the body are caused by excessive production of the adrenal cortex of aldosterone by the tumor [3]. To correct hypokalemia, hypernatremia and metabolic alkalosis were prescribed aldosterone antagonists (veroshpiron) and potassium preparations (asparcam, panangin). If necessary, antihypertensive therapy was prescribed primarily by angiotensin-converting enzyme blockers (captopril, enalapril, lisinopril). Premedication, introduction to anesthesia and its maintenance were carried out according to a standard procedure.

**Cushing syndrome.** Preparation of patients with Cushing syndrome was carried out taking into account the increased secretion of glucocorticoids and the development of gross metabolic disorders, the functions of vital organs [4]. To correct the water-electrolyte disorders were prescribed aldosterone antagonists (veroshpiron), potassium preparations. If necessary, was treated heart failure. If necessary, for increasing antihypertensive therapy were rescribed angiotensin-converting enzyme blockers. 2 patients due to a fairly high level of cortisol in the blood (5 times higher than normal) received inhibitors of biosynthesis of glucocorticoids (mitotan). The revealed cases of hyper coagulation (12 cases) were corrected by the use of anticoagulants, as a rule, of direct action (low and high molecular weight heparin). With diabetes, there was no transfer of patients to simple insulin injections. Premedication was carried out according to the standard outline.

It should be remembered that in patients with Cushing syndrome, the introduction of anesthesia may be accompanied by severe difficulties with intubation of the trachea, or even the inability to perform it in the usual ways due to severe obesity and a short neck characteristic of such patients [9]. Therefore, in the preoperative period, the probability of difficult intubation was necessarily evaluated. For this purpose, when examining the patient, they purposefully determined whether there were restrictions of movements in the cervical spine and a decrease in the mobility of the lower jaw.

**Pheochromocytoma.** The main changes in the body that determine the tactics in patients with pheochromocytoma are high degree of adrenalin and noradrenalin. Taking into account this pre-operatively special role, the study of the state of the cardiovascular system, the diagnosis of water-electrolyte disturbances, and evaluation of renal function [9,10,11]. All patients for stabilization of blood pressure were prescribed  $\alpha$ -blockers (Zaxon, Cardura). These drugs not only effectively reduce blood pressure, but also reduce peripheral vascular resistance and post capacity.  $\alpha$ -blockers were prescribed by specific outline, which provides for a gradual decrease in blood pressure. In severe tachycardia,  $\beta$ -adrenoblockers were used additionally in 6 patients, and in case of persistent hypertension (in 3 patients) were prescribed also calcium channel blockers (nifedipine, nitrendipine) and (in 1 patient) angiotensin-converting enzyme blockers (captopril, enalapril). Given the possibility of various hemodynamic disorders during anesthesia, one of the central veins was catheterized.

**Results and discussion.** All surgical interventions were performed under the combined multicomponent anesthesia with intubation of the trachea and artificial ventilation of the lungs. For introductory and basic anesthesia, ketamin and neuroleptics (fentanyl, droperidol) were used.

The position of the patient, both in the performance of LTAAE, and RPAE, did not primarily affect the parameters of hemodynamics. Only in one case, while performing an RPAE, after giving the

position “on the stomach”, there was a decrease in blood pressure by 40% of the initial. Replenishment of the volume of circulating blood allowed stabilizing hemodynamics and carrying out the planned intervention.

The average duration of LTAAE was  $95.1 \pm 8.1$  minutes, while the left operation lasted longer than the right ( $108.3 \pm 8.5$  min and  $80.5 \pm 7.7$  min, respectively)

The average duration of RPAE was  $78.3 \pm 7.2$  minutes, with the right operation lasting longer than the left ( $84.2 \pm 7.5$  min and  $72.5 \pm 6.5$  min, respectively).

Intraoperative blood loss during VEA was minimal and ranged from 20 to 150 ml (an average of  $65 \pm 25$  ml). In this case, there was no particular difference in blood loss depending on the access.

When performing LTAAE in 1 case, damage to the spleen, which required splenectomy, in 1 - damage to the liver, which required conversion.

When performing RPAE intraoperative complications did not change the course of the operation.

A special effect on the parameters of homeostasis from the introduction of carbon dioxide into the abdominal cavity or retroperitoneal space was not observed.

Given the minimal blood loss, minimally invasive of the interventions performed, the main emphasis in supporting normal homeostasis during surgery was given directly to the process of adrenal removal, namely, the stages of its central vein isolation and its clipping, especially in cases of hormone-active tumor. In the cases of incidentaloma, these stages also passed without special hemodynamic changes.

In most cases of hormonally active tumors, the process of allotment of central vein was accompanied by tachycardia, an increase in blood pressure by 20-30% above the initial one. In cases of pheochromocytoma, the increase in blood pressure above the initial range ranged from 20-30% to 100-150%.

To obtain controlled hypotension were usually used nitroglycerin (from  $30 \mu\text{g} / \text{min}$ ) or its analogues. With severe tachycardia (heart rate more than 120 per minute) were used  $\beta$ -adrenoblockers.

When ventricular extra systole was used lidocaine ( $2 \text{ mg} / \text{kg}$ ). If necessary, lidocaine is administered repeatedly.

In case of inadequate relief of the hypertensive crisis, complications may result, leading in some cases to a fatal outcome on the operating table or in the immediate postoperative period: myocardial infarction, stroke, severe exacerbation of circulatory insufficiency with the development of pulmonary edema.

After clipping the central vein, the pulse normalized, and blood pressure, as a rule, returned to the initial or was noted hypotension.

In cases of pheochromocytoma, arterial pressure, as a rule, sharply decreases. We would like to note that in 2 patients with pheochromocytoma at the initial stage of introduction of endovisual adrenalectomy, was observed the fall in blood pressure to 0. The blood pressure to normal figures was achieved by the introduction of vasopressors.

In cases of hypotension, the rate of infusion therapy was increased to eliminate the resulting discrepancy between the volume of circulating blood and the capacity of the vascular bed, due to the relative lack of endogenous catecholamines and the residual effect of vasodilators previously introduced (therefore, priority in the use of an ultra-short-acting vasodilator (nitro drug) in the first stage of anesthesia). In a number of cases, it is necessary to administer drugs that affect the tone of the vessels and increase the contractile ability of the myocardium (vasopressors).

We would like to note that the introduction of preoperative stabilization of blood pressure by the appointment of  $\alpha$ -adrenoblockers in patients with pheochromocytoma in other patients has allowed us to avoid such jumps.

Complications in the postoperative period were not observed. The average stay of patients who underwent LTAAE was 4.5 bed-days, and after RPAE - 3.2. There were not lethal outcomes after VEA.

Conclusion. Performed 140 VEA show their high efficiency, minimally invasive in tumors of the adrenal gland. At the same time, to date, the size of the tumor should not exceed 10 cm.

Options for the implementation of VEA (LTAAE, RPAE) depend on the experience of the surgeon.

Patients with hormone-active tumors of the adrenal glands need preoperative preparation, since in most cases these patients have homeostatic disorders, especially with Cushing syndrome and pheochromocytoma.

Of particular importance is the conduct of adrenalectomy itself. To ensure smooth flow of adrenalectomy, is necessary a constant contact between the surgeon and the anesthesiologist during the operation (especially during: direct contact with the tumor, usually manifested by arterial hypertension, and at the time the clipping of central vein of adrenal gland, after which arterial hypotension often develops).

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