

# СИСТЕМАТИЗАЦИЯ ПОСЛЕОПЕРАЦИОННЫХ ОСЛОЖНЕНИЙ ГОЛЬМИЕВОЙ ЛАЗЕРНОЙ ЭНУКЛЕАЦИИ ПРЕДСТАТЕЛЬНОЙ ЖЕЛЕЗЫ: СТАНДАРТИЗИРОВАННЫЙ ПОДХОД

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Для цитирования: © Гафаров Р.Р., Гиясов Ш.И. СИСТЕМАТИЗАЦИЯ ПОСЛЕОПЕРАЦИОННЫХ ОСЛОЖНЕНИЙ ГОЛЬМИЕВОЙ ЛАЗЕРНОЙ ЭНУКЛЕАЦИИ ПРЕДСТАТЕЛЬНОЙ ЖЕЛЕЗЫ: СТАНДАРТИЗИРОВАННЫЙ ПОДХОД. ЖКМП.-2024.-Т.4.-№4.-С

Поступила: 05.09.2024

Одобрена: 18.09.2024

Принята к печати: 03.10.2024

**Аннотация:** Статья посвящена оценке эффективности и безопасности гольмиевой лазерной энуклеации простаты (HoLEP) посредством систематизации послеоперационных осложнений у больных с доброкачественной гиперплазией предстательной железы (ДГПЖ). Были изучены результаты HoLEP у 40 пациентов с ДГПЖ. Для оценки послеоперационных осложнений HoLEP была использована адаптированная классификация Clavien-Dindo. При этом с целью определения границы неосложнённого течения послеоперационного периода с осложнённым течением, были унифицированы критерии неосложнённого (нормального) послеоперационного периода хирургических методов лечения ДГПЖ. HoLEP является высокоэффективным и безопасным методом хирургического лечения ДГПЖ. Эффективность лечения достигала 100% ввиду отсутствия осложнений, требующих выполнения дополнительных реконструктивно-пластических вмешательств, а также летальных исходов.

**Ключевые слова:** ДГПЖ, HoLEP, послеоперационные осложнения, систематизация, классификация Clavien-Dindo.

## PROSTATA BEZINING GOLMIY LAZERLI ENUKLEATSIYASIDAN KEYINGI ASORATLARNI TIZIMLASHTIRISH: STANDARTLASHTIRILGAN YONDASHUV

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PROSTATA BEZINING GOLMIY LAZERLI ENUKLEATSIYASIDAN KEYINGI ASORATLARNI TIZIMLASHTIRISH: STANDARTLASHTIRILGAN YONDASHUV.KPTJ.-2024-N.4.-№4-M

Qabul qilindi: 05.09.2024

Ko'rib chiqildi: 18.09.2024

Nashrga tayyorlandi: 03.10.2024

**Аннотация:** Maqola prostata bezining xavfsiz giperplaziyasi (PBXG) bo'lgan bemorlarda operatsiyadan keyingi asoratlarni tizimlashtirish orqali prostata bezining golmiy lazerli enukleatsiyasi (HoLEP) samaradorligi va xavfsizligini baholashga bag'ishlangan. HoLEP natijalari PBXG bo'lgan 40 nafar bemorda o'rganilgan. HoLEPning operatsiyadan keyingi asoratlarini baholash uchun moslashtirilgan Klavien-Dindo tasnifi ishlatilgan. Shu bilan birga, operatsiyadan keyingi davrning asoratsiz kechishi va asoratlangan kechishi o'rtasidagi chegarani aniqlash uchun PBXGni davolashning jarrohlik usullarining asoratlanmagan (normal) operatsiyadan keyingi davri uchun mezonlari standartlashtirildi. HoLEP PBXGni jarrohlik davolashning yuqori samarali va xavfsiz usuli hisoblanadi. Qo'shimcha rekonstruktiv plastik aralashuvni talab qiladigan asoratlar, shuningdek, letal oqibatlar yo'qligi sababli davolash samaradorligi 100% ga yetdi.

**Калит so'zlar:** PBXG, HoLEP, operatsiyadan keyingi asoratlar, tizimlashtirish, Klavien-Dindo tasnifi.

## SYSTEMATIZATION OF POSTOPERATIVE COMPLICATIONS OF HOLMIUM LASER ENUCLEATION OF THE PROSTATE: A STANDARDIZED APPROACH.

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SYSTEMATIZATION OF POSTOPERATIVE COMPLICATIONS OF HOLMIUM LASER ENUCLEATION OF THE PROSTATE: A STANDARDIZED APPROACH. JCPM.-2024.P.4.№4-A

Received: 05.09.2024

Revised: 18.09.2024

Accepted: 03.10.2024

**Annotation:** The article is devoted to the evaluation of the efficacy and safety of holmium laser enucleation of the prostate (HoLEP) by systematization of postoperative complications in patients with benign prostatic hyperplasia (BPH). The results of HoLEP were studied in 40 patients with BPH. To evaluate postoperative complications of HoLEP, the adapted Clavien-Dindo classification was used. In order to determine the boundary between an uncomplicated course of the postoperative period and a complicated course, the criteria for an uncomplicated (normal) postoperative period of surgical methods for the treatment of BPH were unified. HoLEP is a highly effective and safe method for the surgical treatment of BPH. The effectiveness of treatment reached 100% due to the absence of complications requiring additional reconstructive interventions, as well as fatal outcomes.

**Keywords:** BPH, HoLEP, postoperative complications, systematization, Clavien-Dindo classification.

**Introduction:** Benign prostatic hyperplasia (BPH) is an age-associated urological disease, that occurs in elderly males and leads to infravesical obstruction (IVO). A large number of surgical treatment methods have been proposed to eliminate IVO caused by BPH [1,2]. Historically, for a long time, the only effective method for treating BPH was open prostate adenectomy (OPA). According to the recommendations of the European Association of Urology (EAU, 2021), open prostate adenectomy is the most invasive and at the same time the most effective treatment method of BPH with a long-term effect [3,4]. OPA is accompanied by a number of perioperative complications and a long period of hospitalization [5-7]. After the introduction of endoscopic transurethral resection of BPH (TURP), this technique has remained the “gold standard” of surgical treatment of BPH for the past 40 years. It leads to a significant improvement in the quality of urination and the patient’s life [8]. However, TURP can also be accompanied by various complications, the most serious of which are bleeding and TUR syndrome. The number and severity of these complications directly depend on the volume of the gland, with an increase in which morbidity also increases. The desire to combine the radicality of open adenectomy with the minimally invasiveness and safety of endourological interventions has led to the emergence of new alternative treatment options for BPH. One of these methods is holmium laser enucleation of the prostate (HoLEP).

The use of holmium laser for the treatment of BPH was first reported in 1995. Initially, the technique of holmium ablation of the prostate (HoLAP) was proposed, followed by holmium resection (HoLRP) and only then holmium enucleation – HoLEP. Initially holmium laser (Ho:YAG) was combined with neodymium (Nd:YAG). In this case, the first step was circular coagulation by Nd:YAG, after which ab-

lation was performed with the holmium laser [9]. Then HoLRP was introduced, based on laser resection of hyperplastic tissue and formation of a cavity similar to that formed after TURP [10]. With the advent of the transurethral morcellator, which allows the excised prostatic hyperplasia tissue to be crushed and evacuated into the bladder cavity, HoLEP became the mainstay of the holmium laser procedure. This was made possible by the development of a technique for complete enucleation of the prostate gland lobes by enucleation within the existing tissue planes. In this situation, the holmium laser fiber is much like the index finger of a surgeon in an open adenectomy. After any surgical intervention, complications of varying degrees of severity may develop. To date, there is no consensus among urologists on how to correctly define complications and assess their severity after surgical treatments for BPH. This makes it difficult to make reliable and reproducible comparisons of different treatments within a single center, within a center over time, or of identical treatments between centers using similar or different approaches. Therefore, a standardized classification of complications is needed to offer a common platform for interaction among urologists. Clavien-Dindo classification, proposed for systematization of postoperative complications, is applicable to all types of surgical interventions due to its versatility [11, 12]. However, it is applicable to various methods of surgical treatment only after its adaptation taking into account the specifics of a particular surgical intervention.

In Uzbekistan, in recent years, in various state medical centers, private clinics along with the implementation of traditional endoscopic prostatectomy, high-tech, minimally invasive endoscopic methods of surgical treatment of BPH, in particular HoLEP, are actively introduced.

The simultaneous existence and use in practice of various methods of surgical treatment of the same disease both in our Republic and in many other countries, indicates the complexity, and, until now, the unresolved optimal surgical method of treatment of this disease. This depends in turn on various reasons, one of which is the lack of an objective assessment of the quality of surgical methods.

Material and methods. Retro- and prospectively have been studied the results of HoLEP in 40 patients. All patients were operated on at the Republican Specialized Scientific and Practical Medical Center of Urology (RSSPMCU) (Tashkent). Interventions were performed by an experienced surgeon with many years of practice in the field of endourology, but the HoLEP technique being evaluated was at the implementation stage. To adapt to the assessment of postoperative complications of surgical treatment of BPH and subsequently to systematize the complications, we used modified Clavien-Dindo classification system (2004). To correctly assess the patient's preoperative physical status, the American Society of Anesthesiologists physical status classification system (ASA) was used [13]. Results. To adapt Clavien-Dindo classification system initially it was necessary to create criteria for normal postoperative course of surgical treatment of BPH. In our opinion, such criteria for normal postoperative course should be uniform for both open interventions and minimally invasive methods of surgical treatment of BPH, which will allow us to objectively assess the quality of surgical intervention and identify the shortcomings of a particular treatment method. Based on many years of experience of our clinics in the treatment of BPH and postoperative management of patients, we have created criteria for an uncomplicated postoperative course, Table 1. Taking into account our unified criteria of uncomplicated postoperative course after surgical treatment of BPH (Table 1), we determined the boundary where the normal course of the postoperative period can turn into a complicated course and, based on the picture we created, we determined the criteria of complicated postoperative course of surgical treatment of BPH. In doing so, we took into account the degree of their severity, as well as additional conservative and invasive interventions required for their elimination, bringing them into line with the meaning of each of the 5 degrees of the Clavien-Dindo classification. In our opinion, it is especially difficult to assess mild complications of I and II degree and to draw

a line between them based on their increasing severity. For this reason, the creation of a standard (norm) of the postoperative course plays an important role in drawing a line between relatively mild complications, which in practice are eliminated conservatively. Analysis of the postoperative period of 40 patients after HoLEP showed 28 cases of deviations from the normal postoperative course, which were considered as complications.

**Table 1.**

**Criteria for uncomplicated postoperative course surgical treatment of BPH.**

- minor (non-intensive) staining of urine with blood through a urethral catheter and/or cystostomy, without formation of blood clots, without impairment of drainage function and without requirement of additional infusion (more than 1 liter), diuretic therapy or the administration of hemostatics;
- continuous drip irrigation of the bladder for up to 36 hours after intervention;
- an increase in the patient's body temperature to 37.9°C without chills for no more than 48 hours, not requiring antipyretic or infusion therapy (more than 1 liter);
- presence of an intraoperatively installed hemostatic urethral catheter from 12 to 72 hours (as directed by the surgeon) without development of urinary tract infection (UTI) and the need for additional interventions;
- remaining of cystostomy drainage for up to 5 days after surgery;
- transient urinary incontinence for up to 1 month without a UTI.

**8 (28.6%) cases of I grade complications:**

- 2 cases of acute urinary retention after removal of the urethral catheter;
- 6 cases of one-day fever above 38°C or febrile fever (37-38°C) for more than 2 days, requiring the administration of antipyretic drugs;

**16 (57.1%) cases of II grade complications:**

- 3 cases of intense blood staining of urine coming through a urethral catheter and/or cystostomy, hypovolemia due to bleeding, requiring the administration of hemostatic agents and/or additional infusion therapy;

- 1 case of bleeding requiring hemotransfusion;
- 2 cases of difficult urination, requiring additional conservative therapy with alpha-blockers and anti-inflammatory drugs;
- 2 cases of need for analgesics more than 72 hours after surgery;
- 8 cases of exacerbation of the infectious and inflammatory process in the urinary tract (1-acute prostatitis, 7-acute urethritis).

3 (10.7%) cases of IIIa grade complications:

- 2 conditions requiring therapeutic and diagnostic urethroscopy;
- 1 case of gastroduodenal bleeding requiring endoscopic hemostasis.

1 (3.6%) case of IIIb grade complication:

- 1 case of bladder tamponade requiring cystoscopy under spinal anesthesia.

There were no complications of grades IVa, IVb or V.

Thus, after the HoLEP operation, 28 complications were observed in 20 patients (50%). Of all the complications, 24 (85.7%) were relatively mild and were eliminated conservatively. To eliminate 4 (14.3%) complications, invasive interventions were required, one of them under spinal anesthesia. The effectiveness of holmium enucleation of the prostate was assessed based on the following indicators: IPSS (International Prostate Symptom Score); QoL (Quality of Life); Qmax (maximum urinary flow rate); Vpr. - prostate volume; PVR (residual urine volume), which were determined before surgery, as well as 1, 3 and 6 months after surgery (Table 2).

**Table 2.**  
**Efficacy of treatment of patients with BPH after HoLEP, n=40.**

№	Parameter	Before surgery	1 month after surgery	3 months after surgery	6 months after surgery
1.	IPSS	24.7 ± 0.6	7.6 ± 0.2*	6.8 ± 0.2*	5.9 ± 0.2*
2.	QoL	4.5 ± 0.1	3.2 ± 0.06*	2.3 ± 0.08*	2.0 ± 0.06*
3.	Qmax	10.7 ± 1.1	18.9 ± 0.3*	20.05 ± 0.4*	20.9 ± 0.3*
4.	Vpr.	91.0 ± 3.8	28.1 ± 1.0*	26.2 ± 1.0*	25.4 ± 0.9*
5.	PVR	77.2 ± 15.8	26.4 ± 3.1*	21.0 ± 3.3 *	17.1 ± 2.3*

\* $p < 0.05$  compared to the preoperative period value.

HoLEP is a low-trauma and highly effective surgical intervention, given that in this group, the overwhelming majority of patients (92.5%) had an initial high

risk of intervention according to ASA grade III, grade I - in 2.5% and grade II - in 5%. The average value of the risk of intervention according to ASA was  $2.9 \pm 0.06$ . Blood transfusion after HoLEP was required in 1 patient (2.5%). In the late postoperative period, fibrous-sclerotic processes of the urethra and bladder neck leading to recurrent IVO were not observed and no additional surgical interventions were performed for late complications. In connection with the above, the operation was effective in all 40 (100.0%) patients. After HoLEP, patients' rehabilitation occurred earlier due to early removal of urinary catheters: thus, the urethral catheter was removed on average after  $2.2 \pm 0.1$  days, the time patients spent in hospital was only  $3.8 \pm 0.2$  days.

**Discussion:** The Clavien-Dindo classification of postoperative complications is actively used in urology and due to its versatility it has become popular. The reason for this is that the systematization of complications objectively shows the advantages of one method and the disadvantages of another, allows comparing the quality of interventions of different surgeons, the results and effectiveness of treatment in different centers. There is data on the use of the classification system Clavien-Dindo to assess postoperative complications of radical retropubic, laparoscopic and robot-assisted prostatectomies [14,15,16], radical cystectomies [17], endoscopic surgery for urolithiasis [18]. There are studies devoted to the use of this classification after various surgical interventions undertaken for BPH - transurethral resection of the prostate (TURP) and HoLEP [19-21].

But the other side of the coin is that the assessment of a particular postoperative complication differs among different doctors, in different departments and centers due to some subjectivity in the assessment of complications, especially if it is performed directly by the surgeon who performed the operation. For this reason, the creation of unified criteria will avoid such shortcomings and make the classification as objective as possible. Our analysis of the effectiveness of HoLEP based on the assessment of IPSS, QoL, Qmax, Vpr. and PVR (Table 2) demonstrated that all postoperative period parameters were significantly better than the initial ones and laser enucleation was effective. However, only after systematization of postoperative complications it was possible to identify the real picture of the features of the postoperative period of each treatment method.

**Conclusions:**

1. Adaptation of the Clavien-Dindo classification system to the procedures of surgical removal of BPH, in particular to the HoLEP procedure, is possible through the development of criteria for normal postoperative course after surgical treatment of BPH.
2. HoLEP is a highly effective and low-trauma method for eliminating IVO caused by BPH. After HoLEP, early rehabilitation of patients occurs due to the reduction of the catheterization time and hospital stay.
3. After HoLEP, there were no late complications in the form of urethral strictures and urinary bladder neck sclerosis, treatment efficiency was 100%.

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