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# THE USE OF LASER ENUCLEATION IN THE CLINIC "MED ART GROUP" IN THE TREATMENT OF PATIENTS WITH BENIGN PROSTATIC HYPERPLASIA

**Umurzakov J.J.**
Fergana Medical Institute of Public Health, Intern-Teacher,
Department of Urology and Oncology.
**Bozorov Shavkat Toirovich**
Urologist, Department of Emergency Surgical Care No. 3 (Urology),
Fergana Branch of the Republican Scientific Center for Emergency Medical Care.

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***Abstract.*** *Holmium energy is delivered to the tissue by means of flexible quartz fibers containing a small amount of water and is released in short pulses. The absorbing chromophore for holmium energy is water. The wavelength of 2140 nm and the penetrating ability into the pancreatic tissue to a depth of 0.5 mm provides the necessary effect. At the same time, the further spread of energy is prevented by the presence of cellular and extracellular fluid, which in turn prevents the development of a deep thermal tissue effect [4]. Due to the presence of a large amount of water in the pancreatic tissue and, accordingly, excellent thermal conduction, the surgeon is given the opportunity to apply both ablation and coagulation. The pulse mechanism of energy delivery also contributes to the process of tissue vaporization. Moreover, hemostasis is achieved independently of the coagulation profile of the patient, which is ideal for patients undergoing anticoagulant therapy [4].*

***Keywords:*** *Benign Prostatic Hyperplasia (Bph); Holmium Laser Enucleation Of The Prostate (Holep); Laser Surgery; Urology; Minimally Invasive Treatment; Urinary Flow Rate (Qmax); International Prostate Symptom Score (Ipss); Quality Of Life (Qol).*

# ПРИМЕНЕНИЕ ЛАЗЕРНОЙ ЭНУКЛЕАЦИИ В КЛИНИКЕ «МЕД АРТ ГРУПП» ПРИ ЛЕЧЕНИИ ПАЦИЕНТОВ С ДОБРОКАЧЕСТВЕННОЙ ГИПЕРПЛАЗИЕЙ ПРЕДСТАТЕЛЬНОЙ ЖЕЛЕЗЫ

***Аннотация.*** *Энергия гольмия доставляется в ткани посредством гибких кварцевых волокон, содержащих небольшое количество воды, и высвобождается короткими импульсами. Поглощающим хромофором для энергии гольмия является вода.*

*Длина волны 2140 нм и проникающая способность в ткань поджелудочной железы на глубину до 0,5 мм обеспечивают необходимый эффект. При этом дальнейшему распространению энергии препятствует наличие клеточной и внеклеточной жидкости, что, в свою очередь, предотвращает развитие глубокого термического воздействия на ткани [4]. Благодаря наличию большого количества воды в ткани поджелудочной железы и, соответственно, отличной теплопроводности, хирургу предоставляется возможность применять как абляцию, так и коагуляцию. Импульсный механизм подачи энергии также способствует процессу испарения тканей. Более того, гемостаз достигается независимо от профиля коагуляции пациента, что идеально подходит для пациентов, получающих антикоагулянтную терапию [4].*

***Ключевые слова:*** *Доброкачественная гиперплазия предстательной железы (ДГПЖ); Энуклеация предстательной железы гольмиевым лазером (ЭГЛП); Лазерная хирургия; Урология; Малоинвазивное лечение; Скорость мочеиспускания (Qmax);*

*Международная шкала оценки симптомов заболевания предстательной железы (IPSS); Качество жизни (Qol).*

**Introduction**

Benign prostatic hyperplasia (BPH) is a common condition among men over 40 years of age. This condition is characterized by a variety of clinical manifestations, most of which have a negative impact on the patient's quality of life. Lower urinary tract symptoms (LUTS) due to BPH affect more than 20% of American men aged 30 to 79 years, or approximately 15 million men.

The prevalence of LUTS/BPH increases with patient age and reaches 80% among men over 70 years of age.

With holmium laser enucleation, the laser fiber is located at the distal end of the endoscope, which allows you to control the laser fiber and the resectoscope tube simultaneously.

The first stage of holmium enucleation of the pancreas is the implementation of incision at 17 and 19 hours of the conventional dial and then enucleation of the middle lobe of the pancreas is carried out.

Later, the technique of bilobar enucleation and en-bloc enucleation was developed, which, according to some authors, is preferable. Once hemostasis is complete, the enucleated tissue is morcellated and removed [7].

Several studies have assessed the effectiveness of HoLEP based on patient characteristics such as age and pancreatic volume. The effectiveness and safety of surgical intervention in patients with large pancreatic volume (more than 100 g) was confirmed in 2000.

Moreover, the effectiveness of the procedure was comparable to open surgery, while perioperative morbidity was lower in the group of patients who underwent HoLEP [17-20]. In 2007, the results of a 5-year follow-up of patients with large prostates included in a randomized comparative study of laser enucleation of the prostate and open prostatectomy were published.

The authors noted a significant difference in the AUASA questionnaire, Qmax and residual urine volume in favor of the group of patients who underwent HoLEP. The authors did not note a significant difference in the incidence of complications [18]. Later M. Kim et al. published the results of a retrospective study examining the use of holmium laser in patients with very large pancreatic volumes (more than 200 g). And in this work, the authors noted the advantage of HoLEP. The studied outcome indicators according to the questionnaire (IPSS and Qmax) after 6 months of observation were comparable with similar indicators in the group of patients with moderate (100-200 g) and small (less than 100 g) pancreatic volume. During the work, it became clear that a large volume of the pancreas leads to an increase in operation time, a higher incidence of transient dysuria, a longer duration of bladder catheterization and hospitalization. However, as in all previous studies, the authors did not note an increase in the incidence of complications such as bleeding requiring blood transfusion, reoperation and/or conversion to TURP [21]. The main conclusion was the emergence of recommendations for the safe and effective use of holmium laser energy in patients with very large pancreatic volumes. At the same time, there is no doubt that the surgeon has significant experience in performing such an intervention, which allows for more clear guidance during surgical treatment [18-22]

**Purpose and task:** to compare the methods of electroenucleation and laser enucleation (holmium) of pancreatic hyperplasia according to literature sources and our own observations.

**Materials and methods:** 450 patients with benign pancreatic hyperplasia took part in the study; of these, 300 patients underwent holmium laser enucleation of the prostate (HoLEP), 150 underwent monopolar enucleation. The follow-up period for all patients was 1 month. We assessed the IPSS (International Prostate Symptom Score) questionnaire, the quality-of-life index (QoL), the maximum volumetric urine flow rate (Qmax) and the volume of residual urine before surgery and one month after it.

**Research results and discussion**. In the group of patients who underwent HoLEP (n = 300), the IPSS questionnaire score before surgery averaged 15.6±4.2 points, and 1 month after surgery – 10.8±2.6; quality of life index – 4±0.6 and 2.7±1, respectively; Qmax – 5±0.9 and 11.7±3.6 ml/s, respectively; the volume of residual urine is 60.4±32 and 14.5±17 ml, respectively.

The average duration of enucleation was 50.1±13.7 minutes, morcellation – 30.8±17.2 minutes; the average weight of the removed tissue was 80.7±20.8 g. The duration of bladder drainage with a urethral catheter was on average 24 hours, the duration of hospital stay was 3 days. Surgical technique Short-term (up to 3 months) stress urinary incontinence was observed in 32 (7.1%) patients. In 1 case, damage to the ureteral orifice was recorded, which was intimately adjacent to the middle lobe of pancreatic hyperplasia (prostate volume was 176 cm3), and therefore drainage of the upper urinary tract on the left was performed with a catheter-stent for 2 weeks.

After removal of the drainage, urodynamics were completely restored. In the group of monopolar enucleations of pancreatic hyperplasia (n= 150), the preoperative indicators were as follows: average score on the IPSS questionnaire – 18.9±5.5; QoL – 4.3±0.9; Qmax – 8.28± 3.1 ml/s; volume of residual urine – 30 ± 40 ml. The average duration of the operation was 130 minutes; the average weight of the removed tissue was 66 g. The duration of the catheter stay was on average 48 hours, the postoperative bed-day was 8.2 days. Intraoperative bleeding occurred in 2 cases; in one of them, blood transfusion was required, but its need was more likely due to aggravated somatic status. Short-term observation data (after 1 month) were as follows: average score on the IPSS questionnaire – 12.5±3.1; QoL – 4.3±0.7; Qmax increased to 2.8±3.8 ml/s, and the volume of residual urine decreased to 10±8 ml. The incidence of short-term urinary incontinence was 4%. The data obtained indicate the same comparative effectiveness of endoscopic enucleation methods. We did not detect a statistically significant deviation for any of the parameters ($p>0.04$).

**Conclusion**

Today, a large number of different laser surgical systems are available for use, differing in the types of laser energy used. Surgical treatment of BPH can be carried out by any of the laser surgery methods described in this article. Until recently, the most popular, safe and effective methods were to perform HoLEP using respectively holmium laser energy and 532 nm PEF using KTP laser energy. The disadvantages of these methods are well known and studied: long learning curve for HoLEP and long operative time for KTP.

The effectiveness of HoLEP has been well studied through studies using this technique, including numerous randomized controlled trials.

Promising results were first presented in 1998 by P.J. Gilling et al. The researchers reported a prospective study of 64 patients with a mean pancreatic volume of 73 cm. Moreover, after surgical treatment, the authors noted a statistically significant improvement in the maximum urinary flow rate (Qmax) [8]. The largest retrospective study examining the results of holmium laser enucleation of the pancreas involved 1065 patients. Improvement in peak urinary volumetric flow rate increased by 157–470%, while residual urine volume was reduced by at least 80% [9].

Of no small importance in the context of assessing the effectiveness of the performed surgical techniques was the use of validated international questionnaires, such as IPSS, IIEF, QoL. According to the above questionnaires, the final score sometimes improved by 70% [9-16].

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