MODERN TREND OF SURGICAL TREATMENT OF BENIGN PROSTATIC HYPERPLASIA

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Abstract
The article is devoted to the current trend in the surgical treatment of benign prostatic hyperplasia (BPH) - various methods of endoscopic enucleation of prostate hyperplasia tissue. A brief history of formation is presented and a brief comparative analysis of the effectiveness of endoscopic techniques for prostate enucleation is carried out. The need for an adequate assessment of postoperative complications of surgical methods for the treatment of BPH and the need to develop criteria for the normal course of the postoperative period, as well as criteria for postoperative complications, was noted.

Benign prostatic hyperplasia (BPH), as defined by the American Urological Association (AUA), is a histological diagnosis refer-ring to the proliferation of smooth muscle and epithelial cells in the transition zone of the prostate. The transitional zone makes up about 5% of the entire prostate and surrounds the proximal urethra. This zone is characterized by constant growth throughout the life of a man [1]. At the population level, there is a trend to-wards a sharp increase in the prevalence of BPH, which is associated with the aging of the population [2,3].

More than 100 years has passed since open prostate adenomectomy (OPAE) was developed. Naturally, progress did not stand still. During this period, new methods of surgical treatment of BPH were mastered, endourologiical transurethral interventions were widely developed and spread, however, the nature of the complications remained largely the same [4].

The essence of an adenomectomy is the blunt separation or enucleation of the operator of hyperplasia nodes by the finger from the so-called false adenoma capsule, which ensures radicalness. It is this “anatomical enucleation” that is the key criterion for radicalness. However, for all its radical nature, OPAE is very traumatic and is accompanied by a large number of complications. Therefore, the main direction of progressive thought working in the field of surgical treatment of BPH is the creation and implementation of a technique that combines the radicalness of open adenomectomy and minimally invasive endourological techniques. That is, the creation of an ideal method - endoscopic adenomectomy [3,4].

As early as 1983, the term transurethral enucleation (TUE) of the prostate was introduced. Hiraoka Y. [5] described more than 300 cases of TUE, in which he separated the adenoma from the false capsule with a special detaching blunt blade or with the tip of resectoscope in the same way as with an open adenomectomy. Today, this technique is called monopolar enucleation of the prostate (MEP).

European Association of Urology (EAU) guidelines for the treatment of non-neurogenic lower urinary tract symptoms caused by BPH presented in 2016, introduced the concept of endoscopic enucleation of the prostate (EEP), which combines existing types of enucleation [6].

In general, however, speaking of anatomical enucleation, we imply the removal of adenomas along the false capsule. Endoscopic enucleation can be carried out using both laser energy (laser methods) and electrical energy (non-laser methods). Existing EEP methods, in accordance with the recommendations of the European Association of Urology (EAU), include holmium laser enucleation of the prostate gland (HoLEP) and thulium laser enucleation of the prostate gland (ThuLEP) [7], as well as methods of monopolar and bipolar electroenucleation of the prostate gland.

For the first time holmium laser was ap-plied by scientists from New Zealand - Peter Gilling and Mark Fraundorfer. They started working with a holmium laser in 1996 [8], and in 1998 P.J. Gilling, M.R. Fraundorfer [9] pre-sented preliminary results of holmium laser enucleation of prostatic hyperplasia with intravesical morcellation of removed tissue in 14 patients [10]. The creation and use of a morcellator has become a significant event in the use of a holmium laser. This fundamentally new technique pushed into the background the methods of ablation and resection. The combination of vaporizing, hemostatic capabilities of a holmium laser with transurethral morcellation allows effective surgical treatment of large adenomas with immediate improvement in urination and a

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decrease in the number of complications [8,11,12].

With holmium enucleation, laser energy with a power of 60-100 W, concentrated "at the tip" of the laser fiber, allows you to dissect adenomatous tissue. In this case, the adenomatous nodes are separated from the capsule in the same way as it is done with the index finger of the surgeon during an open adenomectomy. Consistently enucleated middle and lateral lobes retrogradely displaced into the bladder and subsequently evacuated using a morcellator. If it is not possible to use a morcellator, the lobes of the prostate gland are partially enucleated and then the devascularized lobes are crushed using a resectoscope and removed via the tube of the latter (the “mushroom” technique). Coagulation of bleeding vessels is en¬sured by removing the tip of the fiber 3-4 mm from the vessel. Saline or glycine solution is used as an irrigation fluid during HoLEP [13].

The combination of the hemostatic capabilities of the holmium laser and transurethral morcellation allows for the effective treatment of even large adenomas, providing an immediate positive urodynamic effect, as with transurethral resection of the prostate (TURP), with fewer complications. The initial use of the holmium laser in the treatment of BPH was a combination of holmium and neodymium Nd:YAG lasers - endoscopic laser ablation of the prostate. A holmium laser was used to vaporize (burn) the channel before conducting a quadrant Nd:YAG with the laser. Later it became possible to vaporize the prostate only with a holmium laser wave and used an electrode with end (side) or end glow - the HoLAP technique (holmium laser ablation of the prostate) [10].

In recent years, HoLEP has become in-creasingly popular. HoLEP has several ad-vantages over TURP, especially in patients with large prostate volumes [14]. According to EAU recommendations, with a prostate volume greater than 80 cm3, HoLEP is the operation of choice along with open adenomectomy and bipolar enucleation [3]. Some authors have called HoLEP the new “gold standard” for the surgical treatment of prostate hyperplasia [15]. In addition, to date, holmium enucleation of prostate adenoma is positioned as a “size-independent” procedure, i.e. applicable to adeno¬mas of any size [16]. Conducted scientific studies confirm the high efficiency of holmium enucleation in the elimination of infravesical obstruction due to prostatic hyperplasia. So, Elmansy H.M. [17] reports positive results of examination of patients even 10 years (62 months) after surgery, including patients with large prostate hyperplasia.

After HoLEP, in 2004, the method of bipolar plasmakinetic enucleation of the prostate (PkEP) appeared, then later, in the late 2000s, other transurethral methods based on laser exposure to the enucleation technique appeared: Tm:YAG (thulium laser with an aluminum yttrium garnet) vapoenucleation (TuhuEP) anatomical enucleation with support for Tm:YAG (thulium enucleation of the prostate - ThuLEP), diode laser enucleation of the prostate (DiLEP) and, finally, enucleation with a green laser “Greenlight” (GreenLEP) with lithium borate modulation (LBO). In 2010 Herrmann T.R. with colleagues were the first to propose a holiumlike technique for enucleation of an adenoma using a thulium laser called ThuLEP (thulium laser enucleation of the prostate). The pulsating radiation of a holmium laser causes a tearing effect, while the constantly generated wave of a thulium laser allows you to smoothly excise tissues and vaporize them, achieving excellent hemostasis. Since water is found everywhere in soft tissues and is the target chromophore, this creates a constant chromophore content in laser-irradiated tissues and leads to a uniform interaction of radiation with tissues [18,19].

As with HoLEP, a large number of studies have been conducted that confirm the effectiveness of ThuLEP [20]. Review of Barbalat et al. [21] showed that thulium laser enucleation of the prostate is a safe and effective procedure. According to the recent AUA and EAU guidelines, ThuLEP is recommended as a prostate size-independent suitable option to resolve BPH. Moreover, ThuLEP has higher intraoperative safety with regard to hemostatic properties, and its short-term results are similar to those of TURP [22]. The use of thulium laser energy for enucleation and separation of hyperplastic tissue from the capsule is accompanied by significant carbonation and leads to the fact that the operator tries to minimize the use of laser energy and carries out for the most part mechanical enucleation with a resectoscope. Modern devices for performing ThuLEP, in particular, thulium fiber laser enucleation of the prostate (ThuFLEP), devoid of such re-strictions.

A number of authors analyzed the effectiveness of HoLEP in comparison with other surgical methods for treating the prostate gland: TURP [23, 24], open adenomectomy [16, 25, 26], the results of HoLEP and ThuLEP were compared [11, 27]. In 2 large meta-analyzes [28, 29], HoLEP and bipolar enucleation were compared with OPAE. They showed that no significant difference between EEP and OPAE was observed in the medium and long-term observation. At the same time, HoLEP is characterized by a shorter period of irrigation, catheterization, and hospitalization.

hospitalization.

In retrospective study of Morozov A. et al. [30] assessment of EEP complications in 1413 patients has been performed. HoLEP, ThuFLEP, or MEP techniques were analysed. All EEP types have shown equal rates of com-plications intraoperatively, postoperatively, and at 6 months follow-up.

With a large number of factors affecting the choice of method, in economically developed countries, preference is given to transurethral, and among transurethral methods, preference is given to methods of EEP. In this regard, there are ideas about the futility of using open methods in our country. However, in many countries of the world, the traditional surgical treatment of BPH - open adenomectomy is a priority method, so it has the right to exist along with the latest modern techniques.

Comparative analyzes of the results of surgical treatment of BPH are carried out systemless by various authors, often only by listing the complications that arose. There is no systematic approach to assessing complications arising after open or transurethral inter-ventions in BPH. There are no adequate criteria according to which it would be possible to evaluate each method even at the stage of its development. Such criteria, in accordance with the Clavien-Dindo classification, were developed according to complications of endoscopic surgery of nephrolithiasis [31].

That is why today the study of the nature of postoperative complications of surgical treatment of BPH, their systematization and comparative analysis in relation to each of the studied methods of surgical treatment, as well as the development of adequate measures to eliminate complications, begins to play an important role. A convenient tool for this purpose can be a modified Clavien-Dindo classification system. This is necessary for the most adequate assessment of endoscopic adenomectomies. We consider it necessary to create a unified standard for the postoperative course of surgical treatment of BPH as the first step to unify this classification. In our opinion, the created unified standard (normal course) of the postoperative period both for OPAE and for minimally invasive methods of surgical treatment of BPH will make it possible to assess objectively the quality of surgical intervention for BPH and reveal the disadvantages of one or another treatment method [32, 33]. Thus, we can clearly say that modern trend in surgical treatment of BPH is represented by different methods of EEP and the future of the surgical treatment of BPH today determined by modern methods of endoscopic enucleation, such as holmium and thulium, as well as bipolar enucleation of the prostate gland. However, open adenomectomy cannot be discounted either, since high-tech operations, such as HoLEP and ThuLEP, are not yet widely implemented and require high-level experience and endoscopic skills in many centers.

The radicalness of surgical treatment for BPH lies in the “anatomical enucleation” of the adenoma within its surgical capsule. Enucleation itself is of paramount importance, and not the energy source by which it is carried out, because the ultimate goal in all cases is precisely anatomical enucleation. Endoscopic adenomectomy using laser or non-laser techniques confidently leads the way in the problem of surgical treatment of BPH and the future lies in the improvement of endoscopic methods.

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