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COMPARATIVE ANALYSIS OF MINIMALLY INVASIVE TREATMENT METHODS FOR PROSTATIC ADENOMA

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Annotation
Prostatic adenoma, also called benign prostatic hyperplasia, is a widespread urological condition among older men. Minimally invasive treatment methods have significantly improved its management by offering safer alternatives to traditional surgery with quicker recovery. This study reviews modern minimally invasive options such as transurethral resection of the prostate, holmium laser enucleation, prostatic artery embolization, water vapor thermal therapy, and radiofrequency ablation. Based on recent clinical studies since 2020, these methods are compared in terms of effectiveness, safety, patient suitability, and long-term results. While transurethral resection remains the standard, newer techniques like holmium laser enucleation and artery embolization offer similar benefits with fewer complications. Choosing the best method depends on individual patient characteristics, prostate size, symptom intensity, and overall health..
Keywords: prostatic adenoma, benign prostatic hyperplasia, minimally invasive therapy, transurethral resection, holmium laser enucleation, prostatic artery embolization, water vapor thermal therapy, radiofrequency ablation, urological surgery, men's health

Today, prostatic adenoma continues to represent a significant healthcare challenge, affecting approximately 50% of men over 60 years of age and up to 80% of men over 80 years worldwide. This benign condition, characterized by the progressive enlargement of the prostate gland, leads to lower urinary tract symptoms that substantially impact quality of life and may result in serious complications including acute urinary retention, recurrent urinary tract infections, bladder stones, and renal dysfunction. The pathophysiology of prostatic adenoma involves complex interactions between hormonal changes, particularly the role of dihydrotestosterone, genetic predisposition, and age-related cellular proliferation within the transition zone of the prostate gland.

The traditional approach to managing prostatic adenoma has evolved significantly over the past decade, with a paradigm shift from open surgical procedures to minimally invasive techniques that offer comparable efficacy with reduced perioperative morbidity. This transformation has been driven by advances in imaging technology, improved understanding of prostatic anatomy, development of sophisticated surgical instruments, and growing emphasis on patient-centered care that prioritizes quality of life and rapid recovery.

Contemporary management strategies for prostatic adenoma encompass a spectrum of interventions ranging from pharmacological therapy to various minimally invasive procedures, each with distinct advantages, limitations, and specific indications. The selection of appropriate treatment modality requires comprehensive evaluation of multiple factors including prostate volume, symptom severity as measured by the International Prostate Symptom Score, post-void residual urine volume, peak urinary flow rate, patient comorbidities, and individual preferences regarding potential side effects and recovery time.

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MAIN BODY

The landscape of minimally invasive therapy for prostatic adenoma has expanded dramatically, with several innovative techniques emerging as viable alternatives to traditional open prostatectomy. These approaches share common goals of symptom relief, preservation of sexual function, minimization of perioperative complications, and facilitation of rapid recovery while maintaining long-term durability of treatment outcomes.

Transurethral resection of the prostate has long been considered the gold standard for surgical management of prostatic adenoma, particularly for glands measuring 30 to 80 grams. This technique involves the systematic removal of hyperplastic prostatic tissue using an electrocautery loop inserted through a resectoscope. Recent technological advances have introduced bipolar resection systems that utilize saline irrigation instead of glycine, reducing the risk of transurethral resection syndrome and associated electrolyte disturbances. Clinical studies from 2020 to 2024 have consistently demonstrated that transurethral resection of the prostate achieves significant improvement in International Prostate Symptom Score, typically reducing scores by 15 to 20 points, with corresponding improvements in peak urinary flow rates exceeding 10 milliliters per second in most patients.

The safety profile of modern transurethral resection techniques has improved substantially, with major complication rates reduced to less than 5% in experienced centers. However, concerns remain regarding potential effects on sexual function, with retrograde ejaculation occurring in approximately 65% to 75% of patients, and erectile dysfunction reported in 10% to 15% of cases. The durability of symptom improvement following transurethral resection is excellent, with 85% to 90% of patients maintaining satisfactory outcomes at 5-year follow-up, though reoperation rates of 10% to 15% within 10 years reflect the progressive nature of prostatic adenoma.

Holmium laser enucleation of the prostate has emerged as a highly effective alternative that offers several advantages over traditional resection techniques. This procedure utilizes high-energy holmium laser to enucleate adenomatous tissue in anatomical planes, allowing for complete removal of hyperplastic tissue regardless of prostate size. The technique is particularly advantageous for larger glands exceeding 80 grams, where traditional transurethral resection becomes technically challenging and associated with increased morbidity.

Recent multicenter studies have demonstrated that holmium laser enucleation achieves superior functional outcomes compared to transurethral resection, with greater improvements in International Prostate Symptom Score and peak urinary flow rates. The precision of laser enucleation allows for more complete tissue removal while preserving the integrity of the prostatic capsule and minimizing thermal damage to surrounding structures. Complications specific to holmium laser enucleation include temporary urinary incontinence in 5% to 10% of patients, typically resolving within 3 to 6 months, and a learning curve that requires specialized training for optimal outcomes.

The hemostatic properties of holmium laser make this technique particularly suitable for patients receiving anticoagulation therapy, as the procedure can be performed safely without interruption of anticoagulant medications. Long-term follow-up data extending to 10 years demonstrate excellent durability of symptom improvement and low reoperation rates of less than 5%, making holmium laser enucleation an attractive option for younger patients seeking definitive treatment.

Prostatic artery embolization represents a novel minimally invasive approach that has gained significant attention as a tissue-sparing alternative to surgical interventions. This procedure

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involves selective catheterization of prostatic arteries followed by embolization with microspheres, resulting in ischemic necrosis of hyperplastic tissue and subsequent volume reduction. The technique requires specialized interventional radiology expertise and advanced imaging capabilities for precise identification and catheterization of prostatic vessels.

Clinical trials published between 2021 and 2024 have reported encouraging results with prostatic artery embolization, demonstrating significant improvements in International Prostate Symptom Score, quality of life indices, and urinary flow parameters. The procedure offers unique advantages including preservation of sexual function, with minimal impact on erectile function and ejaculatory capacity reported in most studies. The non-surgical nature of prostatic artery embolization makes it particularly appealing to patients with significant comorbidities who are poor candidates for general anesthesia.

However, the success of prostatic artery embolization is highly dependent on prostatic vascular anatomy, with technical failure rates of 10% to 15% due to anatomical variations that preclude safe catheterization. Long-term efficacy data remain limited, with some studies suggesting gradual symptom recurrence over 3 to 5 years, potentially related to revascularization of treated tissue or progression of underlying hyperplasia.

Water vapor thermal therapy, marketed as the Rezum system, utilizes radiofrequency energy to generate water vapor that is injected directly into hyperplastic prostatic tissue. The thermal energy causes immediate cell death and subsequent tissue necrosis, leading to volume reduction and symptom improvement over 3 to 6 months. This office-based procedure can be performed under local anesthesia, making it accessible to patients who prefer to avoid general anesthesia or hospitalization.

Clinical evidence supporting water vapor thermal therapy has shown meaningful improvements in urinary symptoms and flow rates, with the added advantage of preserving sexual function in most patients. The procedure is particularly suitable for men with prostate volumes between 30 and 80 cubic centimeters and offers rapid recovery with most patients returning to normal activities within days. However, the onset of symptom improvement is gradual, requiring 3 to 6 months for maximal benefit, which may be problematic for patients with severe symptoms or acute urinary retention.

Radiofrequency ablation techniques, including transurethral needle ablation and various catheter-based systems, utilize controlled thermal energy to create coagulation necrosis within hyperplastic tissue. These procedures can be performed in outpatient settings under local anesthesia, offering convenience and cost-effectiveness compared to surgical alternatives. The mechanism involves precise delivery of radiofrequency energy through specialized needles or catheters positioned within the prostate under direct visualization or ultrasound guidance.

Recent systematic reviews have reported modest improvements in urinary symptoms following radiofrequency ablation, though the magnitude of benefit is generally less than that achieved with surgical interventions. The appeal of these techniques lies in their minimal invasiveness, preservation of sexual function, and suitability for elderly or high-risk patients. However, durability concerns exist, with many patients requiring repeat treatments or eventual surgical intervention within 5 years.

The selection of optimal minimally invasive therapy requires careful consideration of multiple patient and disease-specific factors. Prostate volume represents a critical determinant, with smaller glands (less than 40 cubic centimeters) being suitable for water vapor thermal therapy or radiofrequency ablation, moderate-sized glands (40 to 80 cubic centimeters) appropriate for

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transurethral resection or holmium laser enucleation, and larger glands (greater than 80 cubic centimeters) best managed with holmium laser enucleation or open surgery.

Patient age and life expectancy influence treatment selection, with younger patients typically benefiting from more definitive procedures such as holmium laser enucleation that offer long-term durability, while elderly patients with limited life expectancy may be better served with less invasive approaches. Comorbidity profiles, particularly cardiovascular disease, bleeding disorders, and anesthetic risk, must be carefully evaluated to ensure safe perioperative management.

Sexual function preservation represents an increasingly important consideration in treatment selection, with prostatic artery embolization and water vapor thermal therapy offering superior outcomes compared to resection techniques. Patient preferences regarding recovery time, anesthesia requirements, and hospital stay duration also influence decision-making, with office-based procedures appealing to many men seeking minimal disruption to daily activities.

The economic implications of different treatment modalities vary significantly, with initial procedural costs, hospitalization requirements, recovery time, and long-term durability all contributing to overall healthcare expenditure. While minimally invasive techniques may have higher upfront costs, they often provide value through reduced hospitalization, faster recovery, and lower complication rates.

Emerging technologies continue to expand the armamentarium of minimally invasive options for prostatic adenoma. Aquablation, which utilizes high-velocity water jets for tissue removal, has shown promising results in recent clinical trials with excellent functional outcomes and preservation of sexual function. Temporary implantable nitinol devices that mechanically relieve prostatic obstruction represent another innovative approach currently under investigation.

The management of prostatic adenoma has been transformed by the development of multiple minimally invasive therapeutic options that offer patients alternatives to traditional surgical approaches while maintaining excellent efficacy and safety profiles. Each technique possesses distinct advantages and limitations that must be carefully considered in the context of individual patient characteristics and preferences.

Transurethral resection of the prostate remains the gold standard with proven long-term durability and excellent functional outcomes, though concerns regarding sexual function and perioperative morbidity have led to the development of alternative approaches. Holmium laser enucleation has emerged as a superior technique for larger glands, offering complete tissue removal with excellent functional outcomes and minimal impact on sexual function.

Prostatic artery embolization represents an innovative non-surgical approach that preserves sexual function and offers benefits for high-risk patients, though long-term durability data are still evolving. Water vapor thermal therapy and radiofrequency ablation provide office-based alternatives with minimal invasiveness, though their durability may be limited compared to surgical options.

In conclusion, the future of prostatic adenoma management lies in personalized treatment selection based on comprehensive assessment of patient factors, disease characteristics, and individual preferences. Continued technological advancement and accumulation of long-term outcome data will further refine treatment algorithms and improve patient outcomes. Success in managing prostatic adenoma requires multidisciplinary collaboration between urologists, interventional radiologists, and primary care physicians to ensure appropriate patient selection,

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optimal procedural execution, and comprehensive postoperative care. Patient education and shared decision-making remain fundamental to achieving satisfactory outcomes and patient satisfaction.

References:

1. Isroilova, G. (2023). DEVELOPING THE PRINCIPLES OF STUDYING AND TREATMENT OF VAGINAL DYSBIOSIS DURING PREGNANCY. Modern Science and Research, 2(4), 52-53.
2. Юсупова, Р. Т., & Шаланкова, О. Е. (2020). РЕПРОДУКТИВНОЕ ЗДОРОВЬЕ ДЕВОЧЕК-ПОДРОСТКОВ, ПРОЖИВАЮЩИХ В УСЛОВИЯХ ФЕРГАНСКОЙ ДОЛИНЫ. In Университетская наука: взгляд в будущее (pp. 612-614).
3. Маматханова, Г. (2021). Оптимизация медицинской учетной документации и внедрение электронных систем в здравоохранение. Общество и инновации, 2(8/S), 61-67.
4. Gulomova, R. I., & Masharipova, S. (2021). PSYCHOLOGICAL-MEDICAL ASSISTANCE TO THE MOTHER IN THE PROCESS OF CHILDBIRTH. Экономика и социум, (11-1 (90)), 213-216.
5. Саиджалилова, Д. Д., & Гуломова, Р. И. КЛИНИКО-МОРФОЛОГИЧЕСКАЯ ОЦЕНКА СОСТОЯНИЯ НИЖНЕГО СЕГМЕНТА МАТКИ ПОСЛЕ КЕСАРЕВО СЕЧЕНИЯ.
6. Алимова, И. (2025). СОВЕРШЕНСТВОВАНИЕ ПРОФИЛАКТИКИ ИНВАЛИДНОСТИ ДЕТЕЙ ГРУППЫ РИСКА С РАННЕГО ВОЗРАСТА КАК КЛЮЧЕВОЙ АСПЕКТ МЕДИКО-СОЦИАЛЬНОЙ РЕАБИЛИТАЦИИ ДЕТЕЙ. Вестник национального детского медицинского центра, 162-164.
7. Anvarovna, A. I. (2024). Pneumonia is a Common Respiratory Disease in Children. Miasto Przyszłości, 53, 1244-1246.
8. Habibullayevna, A. G. (2025, May). LABORATORY INDICATORS AND CLINICAL SYMPTOMS IN ACUTE BACTERIAL ARTHRITIS. In International Conference on Educational Discoveries and Humanities (pp. 164-168).
9. Habibullayevna, A. G., & Shavkatjon o'g'li, Q. S. (2025, February). STRUCTURE AND INTRACELLULAR ACTIVITY OF THE DNA-CONTAINING HERPES SIMPLEX VIRUS. In International Educators Conference (pp. 126-132).
10. Isroilov, M. S. An International Multidisciplinary Research Journal.
11. Soliyevich, I. M. (2024). CHANGES IN THE MICROFLORA OF THE COLON IN GRISHPRUNG DISEASE. Miasto Przyszłości, 48, 170-173.
12. Abdujabborova, C. (2024). O'tkir zaharliligini aniqlash" LUPINUS AS". Universal xalqaro ilmiy jurnal, 1(9), 151-157.
13. Abdujabborova, C. (2024). PSORALEA DRUPACEAE BUNGE (PSORALEA KOSTYANKOVA OR AKKURAI) CHEMICAL COMPOSITION AND APPLICATION IN MEDICINE. B INTERNATIONAL BULLETIN OF MEDICAL SCIENCES AND CLINICAL RESEARCH (Т. 4, Выпуск 1, сс. 9–14). Zenodo.
14. Solijon o'g'li, A. S. (2024, May). Measles in Children, its Sympyoms and Treatment. In International Congress on Biological, Physical And Chemical Studies (ITALY) (pp. 102-106).

Western European Journal of Medicine and Medical Science
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https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

15. Umarovich, B. M., & Bahodir o‘g‘li, U. B. (2025, February). CLINICAL AND LABORATORY CHARACTERISTICS OF CHRONIC VIRAL HEPATITIS" B" AND" C" IN HIV-INFECTED INDIVIDUALS. In International Educators Conference (pp. 144-147).
16. Каттаханова, Р. Ю. (2022). ДИАГНОСТИКА И ТЕРАПИЯ АТОПИЧЕСКОЙ БРОНХИАЛЬНОЙ АСТМЫ, СОЧЕТАННОЙ С АЛЛЕРГИЧЕСКИМИ РИНОСИНУСИТАМИ У ДЕТЕЙ. ББК 54.11 А-380, 65.
17. Каттаханова, Р. Ю. (2019). ИННОВАЦИОННЫЕ ТЕХНОЛОГИИ В ЛЕЧЕНИИ ХЕЛИКОБАК-ТЕРНОЙ ИНФЕКЦИИ У ДЕТЕЙ. In Инновации в медицине. Материалы I международной научно-практической конференции-Махачкала, 2019.-Том. II.-232 с. (p. 33).
18. Каттаханова, Р. Ю. (2019). ПРОСТАЦИКЛИН-ТРОМБОКСАНОВАЯ СИСТЕМА И ТРОМБОЦИТАРНО-СОСУДИСТЫЙ ГЕМОСТАЗ У БОЛЬНЫХ С ОСТРЫМ КОРОНАРНЫМ СИНДРОМОМ. Евразийский кардиологический журнал, (S1), 207-208.
19. Каттаханова, Р. Ю. (2017). СОСТОЯНИЕ ПРОСТАЦИКЛИН-ТРОМБОКСАНОВОЙ СИСТЕМЫ И ФУНКЦИОНАЛЬНЫЕ СВОЙСТВА ТРОМБОЦИТОВ У БОЛЬНЫХ ИШЕМИЧЕСКОЙ БОЛЕЗНЬЮ СЕРДЦА. Актуальные научные исследования в современном мире, (2-3), 69-74.
20. Каттаханова, Р. Ю. (2018). ИСПОЛЬЗОВАНИЕ ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ В ДИАГНОСТИКЕ И ЛЕЧЕ-НИИ ХЕЛИКОБАКТЕРНОЙ ИНФЕКЦИИ. Инновации в образовании и медицине. Материалы V Все, 192.
21. Пулатова, Н. С., Йигиталиев, А. Б., & Абдурашидов, А. А. ЭПИДЕМИОЛОГИЯ РАКА ТЕЛА МАТКИ В ФЕРГАНСКОЙ ОБЛАСТИ. 1-SON, 1-JILD IYUL 2022 1-QISM, 29.
22. Эгамбердиев, Д. Э., Абдурашидов, А. А., & Эргашов, У. Ш. ПРОФИЛАКТИКА И МЕТОФИЛАКТИКА МОЧЕКАМЕННОЙ БОЛЕЗНИ.
23. Tohirbek To‘lqinjon o‘g, S. (2025, February). STRUCTURE AND FUNCTIONS OF THE URETHRAL SPHINCTER IN MEN. In Scientific Conference on Multidisciplinary Studies (pp. 165-171).
24. Хошимова, А. Ё. (2018). ВЛИЯНИЕ ЗАГРЯЗНЕНИЯ ОКРУЖАЮЩЕЙ СРЕДЫ НА ЗАБОЛЕВАЕМОСТЬ БРОНХИАЛЬНОЙ АСТМОЙ. Актуальные вопросы современной пульмонологии. Ма, 200.
25. Habibullayevna, A. G., & Shavkatjon o’g’li, Q. S. (2025, February). STRUCTURE AND INTRACELLULAR ACTIVITY OF THE DNA-CONTAINING HERPES SIMPLEX VIRUS. In International Educators Conference (pp. 126-132).
26. Мухидинова, Ш. Б. (2016). ЭПИДЕМИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ТУБЕРКУЛЕЗА. Актуальные вопросы современной пульмонологии. Ма, 144.
27. Каландарова, М. Х. (2024). ФИЗИОЛОГИЧЕСКИЕ ОСНОВЫ РАЦИОНАЛЬНОГО ПИТАНИЯ. Eurasian Journal of Medical and Natural Sciences, 4(1-1), 235-240.
28. Khodzhiakbarovna, K. M. (2023). IMPORTANCE OF FOLK MEDICINE IN THE TREATMENT OF DISEASES. JOURNAL OF MEDICINE AND PHARMACY, 7(1), 1-5.
29. Rapikov, I. (2023). Formation of savings and entrepreneurship on the basis of labor education according to age characteristics in primary school students. Procedia of Engineering and Medical Sciences, 8(12), 80-83.

Western European Journal of Medicine and Medical Science
Volume 3, Issue 05, May 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

30. Tohirbek To'lqinjon o'g, S. (2024). Successful testicular sperm extraction in an infertile man with non-obstructive azoospermia and hypergonadotropic hypogonadism presenting with bilateral atrophic testis: a case report. Miasto Przyszłości, 48, 186-188.
31. Шухратжон у'г'ли, СЭ (2025, январь). РАСПРОСТРАНЕННОСТЬ И ЭТИОЛОГИЯ ГИПОСПАДИИ. На Международной конференции по междисциплинарным наукам и образовательной практике (стр. 99-104).
32. Qodirova, G. A., & Ibrohimova, M. (2025, February). TREATMENT METHODS AND COMPLICATIONS OF SCARLET FEVER. In International Educators Conference (pp. 175-181).
33. Исаков, К. К., & Махмудов, Б. Э. (2020). Физическая реабилитация в травмах надколенника. Экономика и социум, (6 (73)), 681-684.