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Prostate Cancer and the Rise of Focal Laser Therapies: A Narrative Review of Benefits and Limitations

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Abstract

Introduction: Prostate cancer is the second most prevalent cancer in men and remains a major global health concern. Traditional treatment modalities such as radical prostatectomy (RP) and radiation therapy, while effective, often result in significant morbidity, including urinary incontinence and sexual dysfunction.

Methods: A narrative review was conducted to synthesize current evidence on focal laser therapy for prostate cancer. A comprehensive literature search was performed across three major databases: PubMed, Scopus, and Web of Science. The search strategy employed the following Medical Subject Headings (MeSH) terms and keywords: ("Prostatic Neoplasms" [MeSH] OR "prostate cancer") AND ("Laser Therapy" [MeSH] OR "laser ablation" OR "focal therapy"). The search was limited to studies published between 2000 and 2024.

Results: The initial search retrieved 1,444 articles. After a rigorous screening of titles, abstracts, and full-texts, 79 studies met the inclusion criteria and were incorporated into the review. The selected literature enables a comprehensive and critical evaluation of the current state of research on focal laser therapy in the management of prostate cancer.

Conclusion: While focal laser therapies offer promising outcomes with fewer side effects, their long-term efficacy and survival benefits remain uncertain. High-quality studies with long-term follow-up are essential to better define their role in the prostate cancer treatment landscape and inform optimal patient selection.

Keywords: Laser therapy; Minimally invasive surgical procedures; Prostatic neoplasms; Survival.

Introduction

Prostate cancer is the second most prevalent cancer among men and ranks as the fifth leading cause of cancer-related deaths worldwide. Incidence and mortality significantly increase with age, predominantly affecting men over 65.[1] Adenocarcinoma is the most common type of prostate cancer, arising from the secretory cells lining the prostate. It has two main subtypes: acinar adenocarcinoma, which is more prevalent, and ductal adenocarcinoma, characterized by a more aggressive clinical course.[2,3] Prostate cancer represents a significant global burden. Age-standardized incidence rates surpass 59 per 100 000 men in regions such as Europe, North America, Latin America, and the Caribbean, whereas rates remain below 30 per 100 000 in Africa and Asia.[4] Prostate cancer often remains asymptomatic in its early stages. Symptoms typically include urinary difficulties, weak urine flow, hematuria, hematospermia, and bone pain. Several risk factors contribute to prostate cancer, notably advanced age, race, family history, obesity, and diets high in saturated fats. Nevertheless, many men with these risk factors never develop prostate cancer, and some diagnosed patients have minimal or no known risk factors.[5,6] Treatment modalities for prostate cancer, particularly radical prostatectomy (RP) and radiation therapy, significantly affect patients' quality of life. Erectile dysfunction (ED) occurs in nearly all men following radical interventions. Recovery varies depending on the nerve-sparing skills of the surgeon; however, persistent ED profoundly impacts sexual and overall well-being.[7]

Incontinence, ranging from minor leaking to complete loss of bladder control, is another common complication of radical prostate cancer treatments, typically caused by damage to nerves and muscles controlling urination. Such

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side effects highlight the urgent need for exploring more effective and less invasive treatment modalities. Current therapeutic approaches include surgery, radiation, hormone therapy, chemotherapy, immunotherapy, minimally invasive ablative therapies, and active surveillance. Treatment aims primarily to achieve a long-term cure while preserving healthy tissue and minimizing side effects. Ultimately, treatment strategies are personalized based on cancer stage, aggressiveness, patient health status, and personal preferences.

The aim of this narrative review is to comprehensively examine the benefits, limitations, and survival outcomes of focal laser therapies as minimally invasive treatments for localized prostate cancer.

Methods

We prepared this narrative review according to the Scale for the Assessment of Narrative Review Articles (SANRA) guidelines to ensure methodological rigor and quality of reporting. The literature search was performed across PubMed, Scopus, and Web of Science to identify articles on focal laser therapy for prostate cancer. The following MeSH terms and keywords were used: *("Prostatic Neoplasms"[MeSH] OR "prostate cancer") AND ("Laser Therapy"[MeSH] OR "laser ablation" OR "focal therapy")*. Filters were applied to include studies published from 2000 to 2024. This search yielded an initial pool of 1444 articles, of which 79 met the inclusion criteria after abstract and full-text review, ensuring a comprehensive assessment of available evidence on focal laser therapy for prostate cancer.

Diagnosis of Prostate Cancer

Guidelines recommend several methods for diagnosing prostate cancer, including urinalysis (UA), prostate-specific antigen (PSA) testing, digital rectal examination (DRE), and imaging techniques like transrectal ultrasound (TRUS) and magnetic resonance imaging (MRI).[8-10] If cancer is suspected, a biopsy may be scheduled to confirm the diagnosis. In some cases, genomic testing can provide additional prognostic information by analyzing cells for specific gene mutations.[11-13]

PSA testing is commonly used in diagnosing prostate cancer. Although conditions like benign prostatic hyperplasia (BPH) and other prostatic disorders can elevate PSA levels, combining PSA testing with multiparametric MRI improves diagnostic accuracy for prostate cancer. Research has shown that measuring free PSA is more effective for diagnosis compared to total PSA (tPSA). PSA levels in the serum can vary based on factors such as age, weight, and prostate volume, so PSA density is beneficial in distinguishing other causes of rising PSA.[14-18]

The normal PSA level is generally considered to be below 4.0 ng/mL; however, prostate cancer can still occur within this range, though the risk is lower.[19-22] PSA levels between 4-10 ng/mL fall into a "gray zone," indicating a potential risk for prostate cancer but with a high false positive rate.[23] This "gray zone" can also be associated with conditions like BPH, prostatitis, and prostate cancer.[22]

The DRE is another common method used in urological practice to assess prostate health.[23,24] While DRE provides valuable information, it is often criticized due to the discomfort, fear, and potential complications it can cause for patients, as well as its low sensitivity. Studies have shown that the accuracy of DRE is only about 63.45%. Despite its limitations, DRE can still be useful in diagnosing prostate cancer when combined with PSA testing.[23]

Treatments

Radical prostatectomy, the most common surgical treatment for prostate cancer, involves removing the entire prostate and surrounding tissues.[6] There are two main approaches: open RP, which involves a single incision, and robotic RP, which uses several small incisions and specialized tools. Both procedures aim to eliminate the cancer while minimizing side effects.

For those seeking non-surgical options, treatments include radiation therapy, hormone therapy, chemotherapy, and immunotherapy. Radiation therapy options, such as conformal radiation therapy (CRT), intensity-modulated radiation therapy (IMRT), and proton beam radiation, focus on precise targeting of the cancer.[7] Hormone therapy involves androgen deprivation therapy (ADT) and anti-androgens like enzalutamide to limit testosterone, which fuels cancer growth. Chemotherapy is typically reserved for cases where the cancer has spread or when hormone therapy is no longer effective.

Minimally invasive ablative therapies, such as focal laser ablation (FLA) and high-frequency ultrasound ablation, offer another option for localized prostate cancer. These therapies use real-time imaging to apply heat or cold, effectively destroying cancerous tissue while preserving healthy prostate tissue.

The primary goal of prostate cancer treatment is to achieve a long-term cure while reducing the influence on quality of life. This involves removing or destroying cancerous tissue while preserving the functionality of healthy tissue and reducing side effects. Researchers are currently exploring the long-term benefits of focal therapy and other emerging treatments. Focal therapy, for instance, targets and destroys cancerous areas without damaging normal tissue, resulting in fewer and less severe side effects compared to surgery and radiation.

Lasers and Focal Therapies in Prostate Cancer

Radical treatments for small, localized prostate tumors are often considered too invasive, making focal therapy (FT) a more suitable option. FT targets only the tumor within

the prostate, helping to preserve sexual function.[25] Various FT techniques are available, including cryotherapy, high-intensity focused ultrasound, irreversible electroporation, radiofrequency ablation, focal brachytherapy, photodynamic therapy (PDT), and laser ablation.[26,27]

Focal Laser Ablation

FLA, a type of FT, is a minimally invasive procedure used to treat prostate tumors and other soft tissue cancers.[28-30] FLA is particularly effective for treating low-to-intermediate-risk prostate cancer, offering promising results in tumor eradication while preserving the quality of life.[31] This technique is especially suitable for organs and tissues with limited vascularity.[28,29,32] By raising the temperature above 60 °C, FLA induces coagulative necrosis, effectively destroying cancer cells.[32,33] The procedure uses a laser fiber with a diffuser at the distal end to precisely target the tumor. The diffuser emits photons that penetrate the tissue, transferring energy to chromophores, which causes the destruction of the cancerous cells.[32]

FLA shows significant potential in treating low-risk prostate cancer, reducing side effects such as urinary incontinence and sexual dysfunction compared to more invasive treatments.[30]

CO_2 Laser

The CO2 laser emits infrared light at a wavelength of 10.6 μm, which can penetrate pure water to a depth of about 10 μm. This laser is particularly effective for sealing and coagulating small blood vessels (up to 0.5 mm), as well as lymphatics and nerve endings, resulting in better visualization and reduced surgical trauma.

Nd: YAG Laser

The Nd: YAG laser is a solid-state laser composed of yttrium aluminum garnet (YAG) rods doped with neodymium (Nd). It penetrates tissue more deeply than any other laser wavelengths used in surgery. The tissue reaction to Nd: YAG laser radiation is influenced by multiple pigment absorption, particularly in oxyhemoglobin, melanin, proteins, and tissue pigments.

Ho: YAG and Thu: YAG Lasers

Recent advancements in laser technology have led to the development of the pulsed-wave holmium: YAG laser (Ho: YAG) and the continuous-wave thulium: YAG laser (Thu: YAG), with wavelengths of 2140 nm and 2013 nm, respectively. Both lasers are strongly absorbed by water and can be transmitted through an optical fiber, making them well-suited for prostatic surgeries.

PVP and KTP Lasers

Photo-selective vaporization of the prostate (PVP) uses a 532 nm wavelength green light laser for prostate ablation.[34] This minimally invasive technique involves inserting a laser through a cystoscope to vaporize excess prostate tissue, obstructing urine flow.[35,36] Potassium-titanyl-phosphate (KTP) lasers, a developed form of Nd: YAG laser, are used for prostate vaporization. Oxyhemoglobin strongly absorbs them, leading to the precise removal of well-vascularized tissues. However, lithium triborate (LBO) is more effective than KTP.[34,37] Compared to traditional surgery, PVP offers advantages such as reduced blood loss, making it suitable for patients with blood-clotting disorders or those on blood thinners.[38]

The 532 nm wavelength of the green light laser is effective in vaporizing the highly vascularized part of the prostate, with a penetration depth of about 0.8 mm, which is sufficient for efficacy while reducing postoperative complications.[39,40] The coagulation depth in targeted tissue is about 1-2 mm, enhancing the effectiveness of the procedure in treating lower urinary tract symptoms, especially in men with coagulation problems.[40] PVP typically requires an overnight hospital stay, and studies have shown that it effectively improves postoperative symptoms and quality of life scores[3]. The procedure also results in shorter operative times, higher laser fluence, and better outcomes in terms of prostate volume reduction and PSA reduction rates compared to older laser systems like the 120W Green Light HPS™. Most patients experience symptom relief and improved urine flow within 24 hours post-procedure.[41,42]

Innovative techniques like photo-selective sharp enucleation of the prostate have also been developed, showing comparable efficacy and safety to PVP while offering the advantage of removing more tissue with higher efficiency.[35,38] While PVP is generally safe and effective for managing BPH, serious complications can still occur, particularly in patients with large prostates. The main challenges include the need to vaporize a large amount of tissue to achieve a satisfactory outcome and the higher tendency for bleeding due to the highly vascularized nature of the prostate. However, these risks are generally low, and the benefits of the procedure often outweigh the potential complications.[43]

HoLEP Method

For patients with significant benign prostatic enlargement leading to lower urinary tract symptoms, holmium laser enucleation of the prostate (HoLEP) is considered an effective alternative to transurethral resection of the prostate (TURP) and open prostatectomy.[44] HoLEP offers a higher success rate in tissue removal and lower complication rates compared to other BPH treatments.[45] It is a size-dependent procedure, effective for prostate adenomas ranging from 36 g to 170 g.[46-49] HoLEP has shown significant improvements in lower urinary tract symptoms and functional outcomes post-procedure.[50]

HoLEP has proven beneficial for managing enlarged prostates in prostate cancer patients, particularly those

on active surveillance or those preparing for radiotherapy (RT). This procedure not only helps reduce PSA levels but also supports more accurate management plans.[51] HoLEP is effective for prostates of various sizes, including those larger than 125g and as small as 30g, significantly improving voiding and urinary symptoms.[46,52-54] Overall, studies suggest that HoLEP is a safe and effective treatment option, delivering excellent short-term results, especially when compared to open prostatectomy for large prostates.[44,46,55,56]

HoLAP Method

Holmium laser ablation of the prostate (HoLAP) is a safe and effective treatment for prostates smaller than 40 mL, offering advantages such as low bleeding rates and shorter hospital stays. However, due to higher recurrence rates, it is not recommended for prostates larger than 40 mL. The procedure typically takes 60 to 120 minutes, depending on the size of the prostate. Postoperative symptoms may include pain during urination and increased urinary frequency, with some patients experiencing delayed symptom improvement due to bladder overactivity or underactivity. Recovery guidelines suggest avoiding strenuous activities, sexual intercourse, and straddling activities for specific periods. Despite its benefits, HoLAP does not generate tissue specimens for histopathological analysis, which may limit its use in certain cases. Nonetheless, it has shown high efficacy in reducing BPH symptoms, particularly in large-volume cases, outperforming other treatments like bipolar transurethral enucleation of the prostate, bipolar TURP, and thulium laser enucleation of the prostate.[57]

Photodynamic Therapy

PDT is a minimally invasive procedure that combines a photosensitizer (PS), laser light at a specific wavelength, and oxygen to target and destroy cancer cells.[58,59] The PS is activated by laser light, which transfers energy to oxygen, creating reactive oxygen species (ROS) that are cytotoxic to cancer cells and damage tumor vasculature.[60] The PS is administered via intravenous injection or topical application.[61] During the "drug-light interval," the PS is absorbed by the targeted tissue and then activated by exposure to the specific laser wavelength.[61-63] Vascular-targeted photodynamic therapy (VTP) is an advanced form of PDT that offers advantages over traditional PDT. While high doses of the PS in conventional PDT can cause prolonged photosensitivity and damage to healthy tissue, VTP uses a bifunctional prostate-specific membrane antigen (PSMA) ligand to combine imaging, chemotherapy, and PDT, improving antitumor activity and reducing side effects.[60]

Vascular-Targeted Photodynamic Therapy

VTP combines PDT with laser therapy to enhance treatment efficacy by specifically targeting cancerous tissue and addressing incompletely treated areas.[64,65] FLA, which involves the percutaneous fusion of magnetic resonance/ultrasound guidance under local anesthesia, has demonstrated a mean PSA reduction of 60% at 36 months without negatively affecting sexual or urinary function.[31] VTP, on the other hand, utilizes a bifunctional PSMA ligand to create a theragnostic agent that integrates imaging, chemotherapy, and PDT, resulting in improved antitumor activity compared to individual treatments.[64,65]

Survival Analysis

In a study comparing FLA and active surveillance/watchful waiting (AS/WW) for prostate cancer patients, worse overall survival (OS) was observed in the FLA group compared to the AS/WW group (HR: 1.69, 95% CI: 1.02–2.81, $P=0.043$). However, the two groups had no significant difference in cancer-specific survival (CSS) ($P=0.158$). After performing propensity score matching (PSM), it was unexpectedly found that CSS was significantly worse in the FLA group (HR: 17.76, 95% CI: 1.15–275.02, $P=0.040$), while no significant difference in OS was observed. The results remained consistent after double-adjustment with PSM, reaffirming the findings of the study. IPTW analysis further supported the lower OS in the FLA group.[66] Another study of 19,292 individuals compared focal therapy and AS/WW for prostate cancer. Patients receiving focal therapy were older with higher T stage and Gleason score (all $P<0.001$), while those on AS/WW had higher PSA levels ($P<0.001$). Focal therapy patients had a higher risk of overall mortality (OM) compared to AS/WW (HR: 1.76, 95% CI: 1.33–2.33, $P<0.001$). However, regarding cancer-specific mortality (CSM), focal therapy was not inferior to AS/WW (HR = 1.19, 95% CI: 0.29–4.98, $P=0.810$). Subgroup analysis by type of focal therapy showed no significant differences in outcomes for laser ablation compared to AS/WW (HR = 1.51, 95% CI: 0.97–2.37). After adjusting for various factors, including age, focal therapy was associated with a higher risk of OM compared to AS/WW. In patients aged 60-80 years, AS/WW showed better survival outcomes (HR = 1.62, 95% CI: 1.17–2.23, $P=0.003$). Overall, focal therapy was not as effective as AS/WW in reducing mortality in prostate cancer patients, regardless of age.[67] These studies show that FLA is associated with worse OS compared to active surveillance for prostate cancer patients. However, CSS rates do not show significant differences, which suggests that active surveillance may be a more effective approach to managing mortality risks in prostate cancer patients.

A study of 19554 individuals compared the outcomes of cryotherapy and RP for prostate cancer. Patients who received cryotherapy were older with higher PSA levels but lower T stage and biopsy Gleason score (GS). Cryotherapy was associated with a higher overall risk

of death (HR = 4.74, 95% CI 4.20-5.35, $P < 0.001$). After adjusting the covariates, including age, PSA, T stage, and GS, cryotherapy still led to a higher overall risk of death than RP (HR = 2.52, 95% CI: 1.99-3.20, $P < 0.001$). Cryotherapy was associated with inferior CSM compared to RP (HR = 4.81, 95% CI 3.26-7.09, $P < 0.001$). After PSM, cryotherapy patients had higher OM and CSM ([HR = 2.70, 95% CI: 1.99-3.66, $P < 0.001$] and [HR = 2.99, 95% CI: 1.19-7.48, $P = 0.02$], respectively). To sum up, no differences were observed between cryotherapy and RP regarding CSM decline.[68] Another study included 12 875 patients, with 12 433 treated with RP and 442 with FLA. FLA patients were older with higher PSA levels, more advanced tumor stage, and higher biopsy grades ($P < 0.001$), while RP patients had longer follow-up ($P < 0.001$). Survival rates were higher in the RP group, OS ($P = 0.00012$), and CSS ($P < 0.0001$). Adjusted analysis showed a higher any-cause mortality (ACM) rate in the FLA group (HR, 2.35; 95% CI, 1.38- 3.98; $P = 0.0016$), but the CSM rate (HR = 0.61, 95% CI, 0.15-2.45, $P = 0.4879$) was similar after adjustment. For ACM, the FLA group had worse outcomes in certain T-stage subgroups, with specific PSA levels and biopsy GS. However, after matching, the groups were balanced in key variables, with the RP group performing better in survival outcomes. The current research indicates that FLA is at a greater risk of ACM and a slightly reduced chance of CSM compared to RP.[69] The studies indicate that both cryotherapy and FLA are associated with higher OM rates compared to RP, with RP demonstrating superior survival outcomes. Consequently, RP appears to be the more effective treatment option for prostate cancer in terms of overall and CSM.

A total of 93 469 patients were analyzed, with 93 041 receiving radiation therapy and 428 undergoing laser ablations to compare laser ablation to RT in prostate cancer. Patients treated with laser ablation were older ($P < 0.001$) with lower PSA and Gleason scores compared to those treated with RT ($P < 0.05$). In the radiation therapy group, 81 015 patients died, with 1303 dying from prostate cancer-specific causes, while in the laser ablation group, 356 patients died, with seven from prostate cancer-specific reasons. Multivariate regression analysis showed that radiation therapy was associated with better OS than laser ablation (HR = 1.91; 95% CI: 1.51–2.40; $P < 0.001$). Propensity score matching confirmed these findings, with radiation therapy consistently showing better OS benefits (HR = 1.50; 95% CI: 1.17–1.93; $P = 0.001$). Subgroup analyses revealed differences in treatment outcomes based on T stage, PSA levels, and Gleason scores. Sensitivity analysis also supported the radiation therapy over laser ablation in improving OS and reducing CSM (OS HR = 1.40; 95% CI: 1.36–1.44; $P < 0.001$ and CSM HR = 1.21; 95% CI: 1.12–1.31; $P < 0.001$).[70] Radiation therapy significantly improves OS compared to laser ablation in prostate cancer treatment, with notable differences in outcomes based on patient characteristics such as age, PSA levels, and Gleason scores. This study underscores the importance of selecting appropriate treatment modalities to enhance patient survival rates.

A study indicated that focal therapy data often lack robust endpoints, with many published studies lacking systematic follow-up biopsies and a majority of patients not being biopsied. This can lead to bias as PSA and MRI may misidentify responders. The long-term durability of non-morbid therapies for slow-growing diseases remains unknown. The FDA is seeking surrogate endpoints for evaluating focal therapy efficacy, as current markers are inadequate. Challenges in focal therapy include accurate cancer visualization, patient selection criteria, precise therapy localization, and post-treatment surveillance. Overall, establishing the effectiveness of focal therapy in altering the natural history of prostate cancer will require large, long-term studies, which may take decades to complete.[71]

For patients diagnosed with metastatic prostate cancer, treatment decisions typically prioritize systemic therapies. This can include hormone therapy, which works by reducing testosterone levels to slow the growth of cancer cells, or chemotherapy, which aims to kill cancer cells that have spread beyond the prostate.[72] In these cases, traditional focal approaches are generally not advisable, as the systemic nature of the cancer requires a more comprehensive treatment strategy to effectively manage the disease throughout the body.[73,74] Ultimately, treatment plans should be personalized, taking into consideration the individual patient's health status, preferences, and specific cancer characteristics.

The studies collectively indicate that FLA is associated with higher OM rates compared to RP and radiation therapy, which demonstrate superior survival outcomes for prostate cancer patients. Consequently, active surveillance and traditional treatment modalities appear to be more effective in managing mortality risks associated with prostate cancer.

Expansion of Laser Therapies

The development of laser therapies has led to various methods that offer better efficacy with fewer side effects.[75-77] Lasers are widely used in urology and prostate cancer treatment. Among them, Nd-YAG was one of the early lasers used in prostate cancer treatment as an FLA.[34] However, the HoLEP has surpassed Nd-YAG, becoming a recommended therapy in TURP due to its favorable clinical outcomes in terms of durability and reproducibility.[75-79] Each type of laser has unique properties that lend themselves to different techniques, such as vaporization and resection.[34]

Conclusion

This narrative review highlights the increasing adoption

of focal therapies, particularly FLA, as minimally invasive treatments for localized low-to-intermediate-risk prostate cancer. Compared to traditional whole-gland therapies such as RP and RT, focal treatments aim to preserve urinary and sexual functions and reduce treatment-related morbidity. Technological advancements like multiparametric MRI and PSMA imaging have improved the precision of focal therapy, treatment planning, and patient follow-up beyond traditional PSA-based monitoring.

However, evidence regarding the long-term survival benefits of focal therapies remains conflicting. Recent large-scale observational studies suggest higher OM associated with FLA than active surveillance (AS), RP, and RT. Specifically, Li et al reported significantly worse OS in patients treated with FLA compared to AS (HR: 1.69; 95% CI: 1.02–2.81; $P=0.043$).[66] Similarly, Yuan et al demonstrated higher OM rates for focal therapies compared to AS (HR: 1.76; 95% CI: 1.33–2.33; $P<0.001$).[67] Zheng et al also reported that FLA patients had higher all-cause mortality compared to those undergoing RP (HR: 2.35; 95% CI: 1.38–3.98; $P=0.0016$),[69] while Zhou et al found better OS outcomes with RT compared to laser ablation (HR: 1.91; 95% CI: 1.51–2.40; $P<0.001$).[70]

Patient selection remains a critical consideration: Focal therapies are generally suitable for localized, low-to-intermediate-risk prostate cancers, whereas high-risk or aggressive cancers typically require radical treatments for comprehensive disease control. Patient age, general health, comorbidities, and personal preferences strongly influence treatment decisions. Although focal therapies carry potential advantages in terms of fewer side effects and improved quality of life, concerns about higher recurrence rates necessitate rigorous patient monitoring and systematic follow-up.

In summary, focal laser therapies hold considerable promise as effective minimally invasive options for carefully selected patients, offering significant quality-of-life benefits. Nonetheless, the inconsistent and limited survival data underscore the need for further high-quality, prospective studies with longer follow-up periods. This research will be essential to accurately define the clinical role, survival benefit, and optimal patient populations for these innovative treatments, ultimately facilitating informed and personalized decision-making in prostate cancer management.

Authors' Contribution

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Competing Interests

There are no competing interests.

Ethical Approval

This narrative review was conducted in accordance with institutional ethical standards and was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences under the code IR.SBMU.LASER.REC.1403.032. While no direct patient data or clinical interventions were involved, the ethical integrity of the review process was maintained through rigorous literature selection, unbiased synthesis of current evidence, and transparency in reporting both the potential advantages and the limitations of focal laser therapies for prostate cancer. The review aims to contribute responsibly to the scientific discourse surrounding emerging oncologic technologies while upholding academic and ethical standards.

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