Actas Urol Esp. 2017;41(2):71–81

Actas Urológicas Españolas

www.elsevier.es/actasuro

REVIEW ARTICLE

High-dose rate brachytherapy as monotherapy in prostate cancer: A systematic review of its safety and efficacy☆

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Received 23 February 2016; accepted 9 June 2016
Available online 18 January 2017

KEYWORDS
Prostate cancer;
Radiation therapy;
High-dose rate brachytherapy;
Systematic review

Abstract
Context: High-dose rate brachytherapy (HDR-BT) is an increasingly popular treatment for patients with localized prostate cancer (PC).
Objective: To assess the safety and efficacy of HDR-BT as monotherapy in PC.
Acquisition of evidence: A systematic literature review was conducted through searches on MEDLINE (PubMed), Cochrane Library, CDR, ClinicalTrials and EuroScan. We assessed safety and efficacy indicators.
Summary of the evidence: We selected 2 reviews and 12 uncontrolled studies, included in these 2 reviews. In terms of efficacy, local control in 6 studies was 97–100%. The biochemical progression-free survival varied as follows: 85–100% for low risk and 79–92% for high risk. Survival free of metastases was >95% at 8 years, except in one study where the survival rate was 87% at 5 years. The overall survival was ≥95% in 8 studies. In terms of safety, most of the studies recorded acute and long-term genitourinary and gastrointestinal complications, especially grade ≥2. Only 3 studies found grade 4 complications. All studies, except for one without complications, observed genitourinary complications that were more frequent and severe than the gastrointestinal complications. Two studies assessed the quality of life and showed an initial reduction in various domains and subsequent partial or total recovery, except in the sexual domain.

☆ Please cite this article as: Sánchez-Gómez LM, Polo-deSantos M, Rodríguez-Melcón JI, Angulo JC, Luengo-Matos S. Braquiterapia de alta tasa de dosis como monoterapia en cáncer de próstata: una revisión sistemática sobre eficacia y seguridad. Actas Urol Esp. 2017;41:71–81.

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Conclusions: HDR-BT is effective as monotherapy, especially in cases of low to intermediate risk. There is insufficient information on high-risk patients. The short to medium-term toxicity was acceptable. Further research needs to be funded to provide more information on the long-term safety and efficacy of this treatment.

PALABRAS CLAVE
Cáncer de próstata;
Radioterapia;
Braquiterapia de alta tasa de dosis;
Revisión sistemática

Braquiterapia de alta tasa de dosis como monoterapia en cáncer de próstata: una revisión sistemática sobre eficacia y seguridad

Resumen

Contexto: La braquiterapia con alta tasa de dosis (HDR-BT) es un tratamiento de uso creciente en pacientes con cáncer de próstata (CP) localizado.

Objetivo: Evaluar la eficacia y seguridad de HDR-BT como monoterapia en CP.

Adquisición de evidencia: Revisión sistemática de la literatura mediante búsqueda en MEDLINE (PubMed), Cochrane Library, CDR, Clinicaltrials y EuroScan. Se evaluaron indicadores de eficacia y de seguridad.

Síntesis de evidencia: Fueron seleccionadas 2 revisiones y 12 estudios no controlados, incluidos en estas 2 revisiones. En términos de eficacia, el control local en 6 estudios es 97-100%. La supervivencia libre de progresión bioquímica varía: 85-100% en riesgo bajo y 79-92% en riesgo alto. La supervivencia libre de metástasis es >95% a 8 años, salvo en un estudio que es 87% a 5 años. La supervivencia global es ≥95% en 8 estudios. En relación con la seguridad, la mayoría de los estudios recogen complicaciones genitourinarias y gastrointestinales agudas y a largo plazo, especialmente de grado ≥2. Solo 3 estudios encuentran complicaciones grado 4. Excepto uno (sin complicaciones), en los 11 restantes las complicaciones complicaciones genitourinarias son más frecuentes y más graves que las gastrointestinales. Dos estudios evalúan la calidad de vida y muestran un descenso inicial en distintos dominios y posterior recuperación parcial o total, salvo en la esfera sexual.

Conclusiones: La HDR-RT como monoterapia es eficaz, especialmente en riesgo bajo e intermedio. No existe suficiente información en pacientes de riesgo alto. La toxicidad a corto-medio plazo es aceptable. Consideramos necesario potenciar la investigación que aporte más información sobre eficacia y seguridad a largo plazo de este tratamiento.

Introduction

Prostate cancer (PCa) has an incidence in the Spanish population of 70.75 cases per 100,000 men.[1] There are different therapeutic alternatives for the treatment of this disease. The use of brachytherapy (BT) has increased in recent years thanks to new techniques for three-dimensional treatment planning.[2,3] Unlike external beam radiotherapy (EBRT), the BT can be used to treat tumors with very high doses of radiation, reducing treatment time and the likelihood of unnecessary damage to surrounding healthy tissue.[4] BT can be used in combination with other therapies such as EBRT and also as monotherapy.

Low-dose-rate BT (LDR-BT) uses permanent implants of iodine-125, palladium-103 or cesium-131 and is considered a safe and effective procedure.[4,5] High-dose-rate BT (HDR-BT) uses sources of iridium-192 or cobalt-60 by temporary implants that do not remain in the patient. It arises as an attempt to improve the EBRT and allows high doses of radiation. It provides good results, especially for intermediate- and high-risk disease.[2,4,6] HDR-BT avoids the problem of displacement of post-implantation seeds, although some uncertainty remains due to changes caused by edema or bleeding in the volume that has to be treated.[7] The HDR-BT procedure is performed once or repeated several times, depending on the fractionating schema assumed.[4,8] It can be done on an outpatient basis, under epidural or spinal anesthesia. Needles are guided by imaging techniques, and the dose is optimized by a three-dimensional computerized plan that gives maximum coverage to the volume that has to be treated and minimizes the doses received in normal tissues. It supposes less radiation exposure to the patient, family and health professionals, and is a therapeutic cost-effective alternative.[7,9,10]

Dosimetry and treatment plan can be performed by computed tomography (CT), magnetic resonance imaging or transrectal ultrasound (TRUS), depending on available resources, experience and personal preferences.[7,11] Usually, the first step of the procedure is the insertion of the catheters by guide with TRUS under anesthesia in the operating room. In a second step, CT is performed and the placement of the implant catheters is adjusted. Finally, the image is transferred to a computer-workstation planner to conduct the treatment plan. The volumes of interest (target organ and organs at risk) are outlined. The distribution of each catheter is reconstructed and the dose calculation is