

# Permanent implants in treatment of prostate cancer

Marek KANIKOWSKI<sup>1</sup>, Janusz SKOWRONEK<sup>1</sup>, Magda KUBASZEWSKA<sup>1</sup>, Adam CHICHEŁ<sup>1</sup>, Piotr MILECKI<sup>2</sup>

## SUMMARY

Received: 17.10.2007  
Accepted: 7.07.2008  
Subject: review paper

<sup>1</sup> Brachytherapy Department,  
Greatpoland Cancer Center,  
Poznań  
<sup>2</sup> Radiotherapy Department,  
Greatpoland Cancer Center,  
Poznań

Address for correspondence:  
Janusz Skowronek,  
MD, PhD, Ass. Prof.,  
Department of Brachytherapy,  
Greatpoland Cancer Center,  
Garbary Street 15, 61-866 Poznań,  
Poland.  
Tel. +48 61 8850818,  
+48 0602618538 (mobile)  
Fax +48 61 8850834  
e-mail: janusz.skowronek@wco.pl

Low-dose rate brachytherapy (LDR - BT) is one of the radiation methods that is known for several years in treatment of localized prostate cancer. The main idea of this method is to implant small radioactive seeds as a source of radiation, directly into the prostate gland. LDR brachytherapy is applied as a monotherapy and also used along with external beam radiation therapy (EBRT) as a boost. In most cases it is used as a sole radical treatment modality, however not as a palliative treatment. The application of permanent seeds implants is a curative treatment alternative in patients with organ-confined cancer, without extracapsular extension of the tumour. Nowadays three kinds of radionuclide (I-125, Pd-103, Cs-131) are in use worldwide. This technique is particular favorite in United States, in Europe however, high-dose rate brachytherapy method (HDR BT) is more popular in early staged prostate cancer treatment ( as a boost). HDR-BT monotherapy for early stage prostate cancer is still an investigational treatment. As monotherapy LDR-BT seems to be a reliable choice for early stage prostate cancer, according to low morbidity rate good results and short hospitalization. It is curative alternative of radical prostatectomy or external beam radiation (i.e. 3D CRT, IMRT) with comparable long-term survival and biochemical control and most favorable toxicity. The aim of this publication is to describe methods, indications, complications and selected results of prostate cancer LDR brachytherapy.

**KEY WORDS:** prostate cancer, LDR brachytherapy, radioactive isotope, permanent implants, seeds

## INTRODUCTION

Patients with organ-confined prostate cancer are the appropriate candidates for curative treatment. There are several modalities that can be performed in order to treat this kind of cancer, such as: external beam radiation therapy (EBRT), prostatectomy, cryotherapy or interstitial brachytherapy (BT). Brachytherapy is one of the oldest methods and means implantation of radioactive sources directly into the prostate. Permanent low dose rate (LDR) brachytherapy represents the most conformal radiation therapy and the number of patients referred for this radical treatment, grows rapidly, especially in the United States. In 1995 brachytherapy has taken a part in prostate cancer treatment only in 5% (surgery – 65% procedures). Development of new techniques with new computer planning systems caused raising popularity of brachytherapy in US (36% in 2002 and >40% in 2004). Clinical and biochemical control rates of this method is

comparable to radical prostatectomy or EBRT [1], however it is still not easily affordable everywhere because of high procedure costs. There are also several other advantages in LDR-BT. Better toxicity profile with higher dose applying to prostate gland are the main points for brachytherapy in comparison with EBRT. Comparing with radical prostatectomy permanent seed's implantation is a short, one day therapy with lower complication rate during and after the procedure (bleeding, urinary incontinence, impotence). Specific selection of radioactive isotopes and their correct localization, allows to deposit high dose into the prostate tumour with rapid fall off the dose outside the area of treatment and – at the same time – allows to preserve organs at risk (OARs).

The beginning of interstitial brachytherapy as an idea of prostate cancer treatment has been found in the first three decades of XX century. Pasteau and Denning published their data about treatment of patients, with the use

of single application of radium isotope through urethral catheter, directly into prostate gland [2, 3]. Unfortunately, high degree of complications excluded this technique from using it widely and stimulated other centers to look for more efficient modalities.

Another period in history of this procedure can be localized in the 1970s. Permanent implants were placed into malignant tumour after lymphadenectomy under surgeon's vision control. Several centers from US (Whitmore, Carlton) used iodine (I-125) and gold (Au-198) followed by external beam radiation therapy. After long follow-up study they found this method useless, because of unsatisfactory control of seeds position, radioactive danger for department staff and insufficient results in patients with locally advanced disease in comparison with EBRT alone [4].

The development of transrectal ultrasound (TRUS) in the late 80s, caused the emergence of new permanent seeds implantation technique. This procedure was elaborated by Holm and his coworkers using template guidance to help percutaneous needle implantation [5]. Concurrent technology progress including new radioisotopes, afterloading technique and conformal treatment planning, led to a significant turning-point in brachytherapy and yet renewed physician's interest in the procedure of localized prostate cancer treatment. This technique was supported by improved dosimetry and offered the potential advantage by delivering a higher radiation dose directly to the prostate, instead of external beam radiation. Rapid fall in the dose with a square of distance from

the center of the isotope allows the use of doses into the tumour with concurrent protection of adjoin healthy tissues. These main facts permit to increase the concentration of the dose with application of higher, biological equivalent and fraction doses inside the prostate.

LDR-BT, a well-known technique all over the world is usually applied as a monotherapy. The reason why in Poland none of brachytherapy departments uses permanent implants is simple. High cost of an implantation do not transpose into higher 5-year disease-free survival rate of external beam radiation therapy or radical prostatectomy [6,7]. As it was mentioned above, it is still very exclusive form of treatment, where single procedure equals to seven weeks of EBRT with lower rates of late complication rates [8]. Satisfactory results of using LDR implants are possible due to punctilious selection criteria of the patients.

The aim of this publication is to describe methods, indications, complications and selected results of LDR-BT with the administration of permanent implants in prostate cancer treatment.

#### Indications and contraindications

The American Brachytherapy Society (ABS) has formed recommendations on consensus panel through clinical experience of experts and their analysis of published data. According to their publications the appropriate candidates for LDR monotherapy are patients with a high probability of organ-confined disease (Table 1). In this group with expected good results prescribed doses for low dose rate brachytherapy

**Table 1.** American Brachytherapy Society recommendations for transperineal permanent brachytherapy of prostate cancer [9]

Selection criteria	BT recommended, good	BT optional, fair	BT investigational, poor
PSA (ng/ml)	< 10	10–20	>20
Gleason score	5-6	7	8-10
Stage	T1c–T2a	T2b–T2c	T3
IPSS	0–8	9–19	>20
Prostate volume (cm <sup>3</sup> )	< 40	40–60	>60
Q max (ml/s)	>15	15–10	<10
Residual volume (cm <sup>3</sup> )			>200
TURP +			+

IPSS – International Prostate Symptom Score, Q – maximum urinary flow rate in ml/s, TURP – transurethral resection of the prostate

Download English Version:

<https://daneshyari.com/en/article/1857199>

Download Persian Version:

<https://daneshyari.com/article/1857199>

[Daneshyari.com](https://daneshyari.com)