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Postoperative brachytherapy for endometrial cancer using a ring applicator

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ABSTRACT

BACKGROUND: To evaluate the rate of vaginal, pelvic, and distant failures and acute toxicity after postoperative vaginal vault brachytherapy (VBT) delivered by a ring applicator in women with high intermediate-risk endometrial cancer.

METHODS AND MATERIALS: A total of 100 patients were treated with VBT after a total abdominal hysterectomy and bilateral salpingo-oophorectomy for a Stage IA or IB (International Federation of Gynecology and Obstetrics 2009) intermediate-risk endometrial cancer; 26 patients received 30-Gy low-dose-rate, 74 patients received 28-Gy pulsed-dose-rate brachytherapy.

RESULTS: At a median followup of 37 months (range, 1–107), 6 (6%) patients showed failures. Three patients developed an in-field recurrence in the vaginal vault: 1 was isolate, whereas the other 2 showed simultaneous pelvic and/or distant failure. A fourth patient developed an out-of-field recurrence in the posterior vaginal wall of the proximal half of the vagina, including pelvic and distant failure. Two other patients showed only distant failure. The estimated 3-year actuarial rate of any vaginal recurrence was 2.6% (95% confidence interval, 0–6.3%). The 5-year overall survival was 84%, similar to that in the female Dutch population matched for age and date of diagnosis. The acute side effects were low, consisting mainly of the occurrence of temporary diarrhea (2%).

CONCLUSION: Postoperative VBT by a ring applicator results in a low recurrence risk, survival rates comparable with the normal female population, and a very low risk of acute morbidity.

Keywords: Endometrial cancer; Vaginal brachytherapy; Ring applicator

Introduction

Vaginal vault brachytherapy (VBT) is standard of care for postoperative radiotherapy in women with high intermediate-risk (HIR) endometrial cancer (1). Postoperative radiotherapy may reduce the local recurrence risk from 20% to 4% (2–4), and VBT is equally effective as external beam radiotherapy (EBRT), with less acute and late toxicity (1). Most treatment centers use the so-called cylinder applicator (CA), with a prescription length of mostly 3–5 cm of the superior vaginal epithelium (5). With the limited prescription length of only 2 cm of the vaginal cuff, brachytherapy with the ring applicator (RA) will be limited to the upper vaginal vault. This can also be obtained with colpostats, or with a CA with a prescription length of 2 cm (Fig. 1).

In the present study, we report the efficacy of postoperative brachytherapy by an RA in 100 consecutive women who had a radical hysterectomy for intermediate-risk endometrial cancer.

Methods and materials

Between 2001 and 2009, 100 patients had VBT after surgery for a Stage IA or IB (International Federation of Gynecology and Obstetrics 2009) intermediate-risk endometrial

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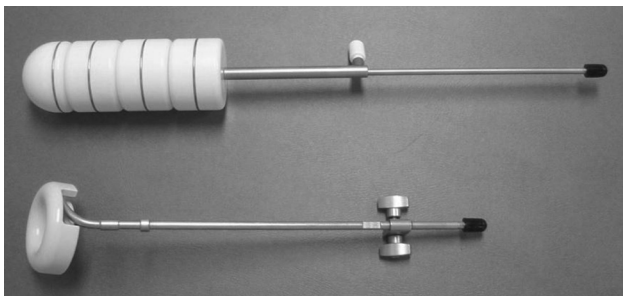

Fig. 1. Cylinder and ring applicators.

cancer (Post-Operative Radiation Therapy for Endometrial Carcinoma [PORTEC] criteria) (3).

The risk factors identified in the PORTEC-1 trial were Grade 3, aged 60 years or older, and deep myometrial invasion (3). Patients with at least two of these three risk factors were classified as an HIR for developing a local recurrence. The patient and tumor characteristics are summarized in Table 1. Surgery consisted of a total abdominal hysterectomy and bilateral salpingo-oophorectomy without routine lymphadenectomy. A pelvic lymphadenectomy was performed in 13 patients. Five patients were diagnosed with a clear cell carcinoma. Of all patients, 90% had VBT within 10 weeks after surgery.

A standard technique and dose prescription were used throughout. Patients were treated in lithotomy position with introduction of a Foley balloon catheter in the bladder and topical lidocaine anesthesia at the vagina to insert the RA. Ring diameter ranged from 26 to 34 mm. The RA is pressed by packing against the vaginal vault: The packing is individually introduced to allow a good fixation and for more distance between the posterior and anterior part of the RA and the rectum and bladder, respectively. Imaging was performed with a pelvic CT scan and 2-mm slice thickness. The VBT was delivered using an RA with the reference 100% isodose covering the vaginal vault at 5-mm depth from the vaginal mucosa, which means a high dose region to the vaginal scar and the superior 2-cm vaginal vault (Fig. 2). Standard planning was with equal dwell times for all the chosen dwell positions. Limited dwell time optimization was allowed to reduce rectal or bladder dose if necessary. Patients were hospitalized in radiation-protected rooms during treatment (1–2 days), and clinical control was used to secure the position of the RA during the treatment. Any discomfort because of insertion of the applicator or packing of the vagina was treated with acetaminophen 500–1000 mg. Of the 100 patients receiving VBT, 26 received low-dose-rate (LDR; 100 cGy/h) VBT using ^{137}Cs sources. A total dose of 30 Gy was delivered in a single insertion.

About 74 patients received pulsed-dose-rate (PDR) VBT using ^{192}Ir sources. A total dose of 28 Gy was delivered in 28 fractions with pulsed dose of 1 Gy every hour to a depth

Table 1
Patient (n = 100) and tumor characteristics

Characteristics	No. of patients
Age (yr)	
<60	23
60–70	46
>70	31
Median (range)	65 (31–89)
Tumor grade	
1	36
2	44
3	20
FIGO stage (1988)	
Ib	18
Ic	78
IIa	2
IIIa	2
FIGO stage (2009)	
IA	21
IB	79
Risk stratification (PORTEC criteria)	
Low intermediate risk	18
High intermediate risk	82
Vascular invasion	
Present	4
Absent	96
History of cancer	
Yes	15
No	85

FIGO = International Federation of Gynecology and Obstetrics; PORTEC = Post-Operative Radiation Therapy for Endometrial Carcinoma.

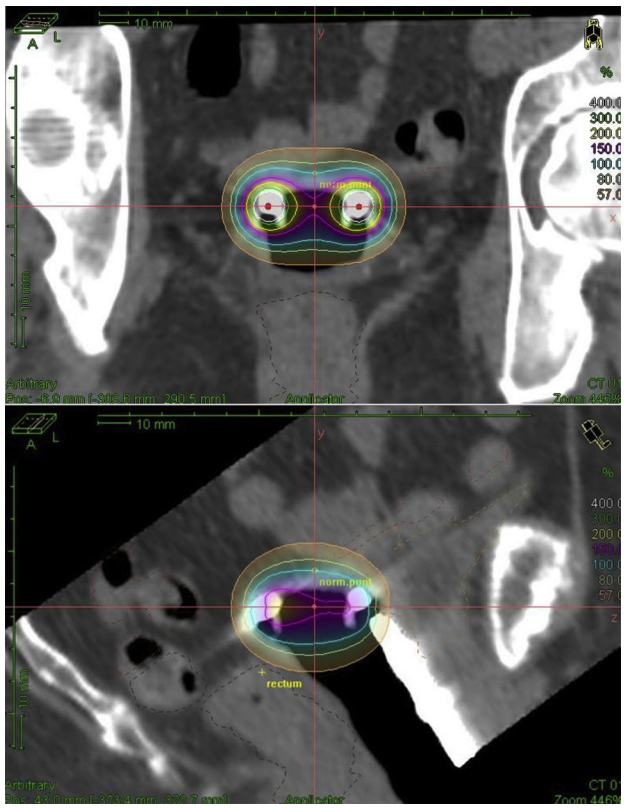

Fig. 2. Coronal and sagittal view of the isodoses, covering the vaginal vault at 5 mm from the surface.