

HIGH DOSE RATE VERSUS LOW DOSE RATE BRACHYTHERAPY IN TREATMENT OF CERVICAL CANCER

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INTRODUCTION: Since Margaret Cleaves performed intracavitary brachytherapy for cancer of the cervix in 1903, the radiation therapy of cervical cancer has traditionally been based on low dose rate (LDR) intracavitary brachytherapy. Recent technical advances in high dose rate (HDR) brachytherapy offer the opportunity for individualized dosimetry, outpatient treatment and elimination of radiation exposure of medical personnel. Although HDR brachytherapy has been used successfully for more than 30 years in Asia and Europe, its use has been relatively low in the United States.

BACKGROUND: Historically, HDR brachytherapy was applied to cervical cancer by Henschke et al. and O'Connell et al. in the early 1960s. In 1972, Joslin et al. reported their experience with HDR brachytherapy for cervical cancer. Since that time, a number of clinical studies proved the equivalence in pelvic control and overall survival between LDR and HDR. However, most of these trials are retrospective studies compared with historical controls. There are a few single institution studies that directly compared LDR with HDR brachytherapy in the literature. There are now four single-institution published randomized trials comparing LDR to HDR brachytherapy.

PURPOSE: To review the clinical outcome retrospectively of cervical cancer patients treated with either high dose rate (HDR) or low dose rate (LDR) brachytherapy.

METHODS: Seventy nine patients with carcinoma of the cervix (22 Stage IB, 42 Stage II, 15 Stage III) were treated with curative intent using a combination of external beam radio-therapy and intracavitary brachytherapy from January 2000 through December 2003 in N.N. Blokhin Russian Cancer Research Center, Moscow. 51 LDR patients were compared to 28 HDR patients. Two groups were treated during the same period. An external beam dose of 45 Gy to the entire pelvis was delivered at 1.8 Gy per fraction to most patients before the intracavitary insertion in both groups. Brachytherapy was delivered in one to two LDR implants or 4 to 5 HDR implants at 6 Gy per fraction. The prescribed dose to Point A for LDR was at least 80 - 85 Gy. Patient characteristics were similar for each study group. Point A doses were similar for each stage. The primary endpoints assessed were survivals and failure sites. Endpoints were estimated using the Kaplan - Meier method and comparisons between treatment groups were performed using the log-rank test.

RESULTS: The median follow up was 48 months for the LDR group and 59 months for the HDR group. For all stages combined and stage for stage in both groups, there was no statistically significant difference in locoregional control, and cause related survival and overall survival for LDR compared with HDR. Locoregional control and overall survival were 78% and 60% for LDR compared to 76% and 55% for HDR at 3 years, respectively ($p=0.96$ and $p=0.48$). Median cause related survival values for LDR vs. HDR were 71 and 81 months, respectively ($p=0.62$). The cause related survival for LDR patients was 62% compared with 59% for HDR patients at 3 years. For Stage IB2, II, and III LDR patients, cause related survival rates were 62%, 67%, and 45%, compared to 67%, 57%,

and 33% for HDR at 3 years, respectively ($p=0.75$, $p=0.95$, and $p=0.48$). For patients with a recorded site of 1st. failure, the most common site was locoregional (56%) and then distant metastases (26%).

CONCLUSIONS: Similar outcome was observed for LDR compared with HDR intracavitary brachytherapy for the entire study. In this review, HDR group was not inferior to LDR group in advanced stages. This is likely because our patients were treated with brachytherapy after a high dose of external pelvic radiotherapy in both LDR and HDR patients.