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Clinical outcome of high dose rate interstitial brachytherapy in vulvar cancer: A single institutional experience

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ABSTRACT

PURPOSE: With an aim to evaluate and report high dose date interstitial brachytherapy (HDR-ISBT) in vulvar cancers, we undertook this retrospective analysis.

METHODS AND MATERIALS: Histologically proven vulvar cancers treated with HDR-ISBT between 2001 and 2016 were analyzed. Radiotherapy details, clinical outcome in terms of local control rates, survivals, and toxicities were evaluated.

RESULTS: A total of 38 patients received HDR-ISBT, with definitive radiation in 29 (76.3%), adjuvant postoperative in six (15.8%) and salvage radiation in three (7.9%) patients. Of them, 29 patients received brachytherapy boost and nine patients ISBT alone. BT procedure included free-hand plastic tube technique in 23 (single [$n = 5$] or multiple plane [$n = 18$]), 13 patients with template based and two patients combined approach. Patients with brachytherapy alone received median EQD2 of 38.4 Gy_{10} (35.5−46.7 Gy_{10}), as boost received median 23.3 Gy_{10} (13−37.3 Gy_{10}). At 3-month post-treatment response evaluation, 30 patients achieved clinically complete response, two patients partial response and six maintained postoperative status. With a median follow-up of 30 months, 29 (76.3%) were disease free, and 9 (23.7%) patients had relapsed disease with four patients expired due to disease and two died of other causes. The 5-year overall survival, disease free survival, and local control rates were 82%, 51%, and 77%, respectively.

CONCLUSIONS: HDR-ISBT in vulvar cancer is a feasible and a viable option with acceptable and comparable outcomes.

Keywords: Vulvar cancer; Interstitial brachytherapy; HDR; Clinical outcome; Toxicity

Introduction

Vulvar cancer is a rare disease accounting only 3%−5% of all gynecological malignancies (1). Squamous cell carcinoma is the commonest histology accounting for 90%−95% followed by other rare histologies (2). Clinical tumor size, stage, and nodal disease represent the most important prognostic factors for the outcome (3, 4). In patients with early stage disease without nodal involvement, the overall 5-year survival rate is 80%−90%, whereas in patients with nodal involvement, the 5-year OS rate drops to 50%−60% (5).

Although surgery is the mainstay of treatment, nonsurgical modalities including radiotherapy and chemotherapy play an important role in the management of vulvar cancer (6, 7). Radical radiation therapy either as external, brachytherapy (BT), or both in a definitive, adjuvant, or salvage has been tried. Radiation therapy, in particular brachytherapy is technically challenging in vulvar cancers. Historical series have reported reasonable outcomes with low dose rate (LDR) and pulsed dose rate brachytherapy (BT) which are comparable to contemporary surgical series (8, 9). In the recent past years, LDR/PDR BT has been replaced by

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high dose rate (HDR) BT. However, the experience with HDR BT in vulvar cancer is limited (10, 11). With an aim to evaluate and report our clinical experience of HDR BT in vulvar cancers, we undertook this retrospective analysis.

Methods and materials

Between January 2001 and January 2016, patients with histologically proven vulvar squamous cell carcinoma who received interstitial brachytherapy with HDR were analyzed. Case records of all patients were retrieved. Patient demographics including age, stage, tumor characteristics, and treatment details including external radiation, brachytherapy, toxicity, and clinical outcome parameters were recorded, compiled, and analyzed.

Brachytherapy procedure

HDR-ISBT was usually performed either as a part of definitive therapy with/without EBRT or as adjuvant postoperative therapy for primary/secondary tumors or as salvage treatment in postoperative recurrent tumors. All patients were hospitalized a day before the procedure for parts and bowel preparation. The procedure was performed under spinal or general anesthesia with patient placed in a low-dorsal lithotomy position. After thorough clinical examination under anesthesia and mapping of disease, radio-opaque silver markers were implanted to assist delineation of tumor on planning imaging. BT procedure involved insertion of 6-F plastic catheters or 18-F bevel-edged stainless-steel hollow rigid needles (curved/straight) into the vulvar tissues of varied lengths with safety margin either by freehand or under the guidance of different templates. Implantation techniques were guided by the Paris system rules in terms of spacing and margins accounting for the residual tumor size in all three dimensions.

Free-hand implant was done to treat the superficial vulvar lesions, template-based straight needles for treatment of deep vulvar lesions extending into vagina and combined freehand and template based if vulvar lesions had both superficial and deep components to be treated. An example of a freehand for a typical superficial vulvar lesion and combined freehand and template-based procedure for more advanced vulvar lesion with dose distribution in shown in Figs. 1 and 2. All the catheters were secured either with beads and buttons for plastic tubes or fixation screws for needles. Templates were additionally secured by fixation to perineal skin with corner stitches. In the initial period, orthogonal X-ray based and since 2005, three dimensional CT-imaging based planning was performed.

Treatment planning was done using either PLATO-Sunrise v14.3 (Nucletron, Veenendaal, The Netherlands) or Oncentra v4.3 (Nucletron, Elekta, Stockholm, Sweden) treatment planning systems. The planning principles included defining the dwell positions in relation to the desired target (defined by radio-opaque markers), basal dose rate points,

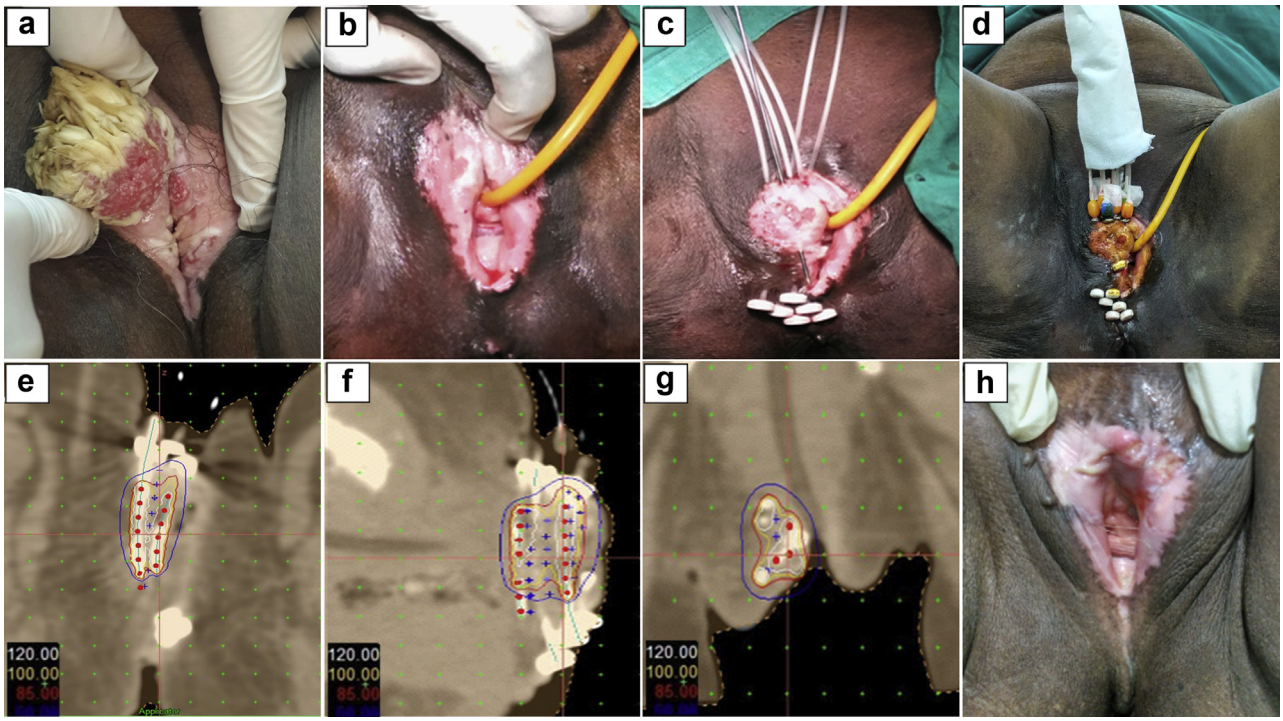

Fig. 1. Panel showing the pictures and dose distribution of a typical freehand HDR interstitial vulvar brachytherapy and outcome at 3 months. a, at presentation; b, post external radiation; c and d, catheter placements; e, f, and g, representative axial, sagittal, and coronal CT images with isodose distributions; h, post treatment 3-month follow-up outcome.