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Clinical outcomes after interstitial brachytherapy for early-stage nasal squamous cell carcinoma

Warren Bacorro[1,2,3], Alexandre Escande[1,2,4], Stéphane Temam[5], Isabelle Dumas[1,2], Emilie Routier[6], Marie-Catherine Gensse[1,2], Pierre Blanchard[2], François Janot[5], Christine Mateus[6], Yungan Tao[2], Caroline Robert[6], Eric Deutsch[2], Christine Haie-Meder[1,2], Cyrus Chargari[1,2,7,8,*]

[1]*Brachytherapy Unit, Gustave Roussy, Villejuif, France*
[2]*Department of Radiotherapy, Gustave Roussy, Villejuif, France*
[3]*Department of Radiotherapy, Benavides Cancer Institute, University of Santo Tomas, Manila, Philippines*
[4]*Department of Radiotherapy, Oscar Lambret Cancer Center, Lille, France*
[5]*Department of Head-and-Neck Surgery, Gustave Roussy, Villejuif, France*
[6]*Department of Dermatology, Gustave Roussy, Villejuif, France*
[7]*Institut de Recherche Biomédicale des Armées, Bretigny-sur-Orge, France*
[8]*French Military Health Academy, Ecole du Val-de-Grâce, Paris, France*

ABSTRACT

PURPOSE: Radiotherapy of nasal carcinomas results in cure rates comparable to surgery, with anatomic preservation and good cosmesis. Brachytherapy (BT) overcomes difficulties with dosimetric coverage and affords a localized and highly conformal irradiation. We report our experience of BT for early-stage nasal squamous cell carcinomas (SCCs).

METHODS AND MATERIALS: Clinical data, BT parameters, and outcome of consecutive patients treated by interstitial BT in our institute between December 1982 and April 2015 for a localized nasal SCC were examined. A total of 34 patients with newly diagnosed T1-2N0-1 nasal skin (n = 22) or nasal cavity (n = 12) SCC were identified. Implantation and dosimetry were done according to the Paris system rules. Low-dose-rate (n = 30) or pulsed-dose-rate (n = 4) techniques were used. Median dose was 70 Gy (64−75 Gy). Sites of tumor recurrence, toxicity rates, and cosmesis outcome were examined.

RESULTS: Median followup time was 89 months. All patients achieved complete response. Five patients experienced local failure, with a median interval of 9 months (range, 5−12 months). Grade 3 acute reactions were reported in 2 patients (6%). Most delayed complications were mild to moderate, and good or fair cosmesis was achieved in 97%. Estimated local failure-free survival and disease-free survival rates at 5 year were 85% (95% CI = 68−94%) and 76% (95% CI = 58−88%), respectively.

CONCLUSIONS: Interstitial BT is effective for selected nasal SCCs, with durable local control, acceptable toxicity, and good cosmesis. © 2017 American Brachytherapy Society. Published by Elsevier Inc. All rights reserved.

Keywords: Nose; Squamous cell cancer; Brachytherapy; Interstitial

Introduction

Nasal carcinomas consist primarily of cutaneous cancers (mainly represented by basal cell carcinoma [BCC] and squamous cell carcinoma [SCC]) and nasal cavity SCC. The optimal management for these cancers, given their location, should afford local control and at the same time anatomic preservation and good cosmesis.

Regarding nasal skin tumors, BCCs are more common than nasal cutaneous SCC, but the latter is associated with

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* Corresponding author. Brachytherapy Unit, Gustave Roussy, 114 rue Edouard Vaillant, Villejuif 94800, France. Tel.: +33 1 42 11 45 66; fax: +33 1 42 11 45 67.

E-mail address: cyrus.chargari@gustaveroussy.fr (C. Chargari).

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more infiltrative growth and higher rates of perineural invasion. Surgery would require wider margins for lesions in high-risk areas that include the nose, which may necessitate grafting or reconstruction due to the limited tissue thickness (1). Among patients with nasal cutaneous SCC, lower local control rates have been achieved, and the procedure may be associated with significant risk in this generally elderly population who often present with multiple comorbidities. Radiotherapy has been proposed as an alternative to surgery for early-stage BCC and SCC, with comparable cure rates (2). Therefore, it is one option for treatment of areas where functional and cosmetic preservation is of importance, such as the nose (3–6). Orthovoltage x-rays or electron beams have been used for the radiotherapeutic management of nasal cutaneous cancers but could be difficult due to the irregular surface of the nose and proximity of underlying cartilage and bone. The inherent limitations of these modalities due to their physical properties have been thoroughly discussed (7,8). In these cases, brachytherapy affords better customizability and shortened overall treatment time. Although surface mold brachytherapy can adequately treat tumors with up to 3–5 mm depth of infiltration, interstitial implants are necessary for more deeply penetrating tumors (9–11).

Carcinomas of the nasal cavity are less accessible to surface brachytherapy although the use of customized intranasal mold for a superficial carcinoma of the nasal vestibule has been described (12). For these patients, interstitial brachytherapy has also been proposed, with or without external beam radiotherapy, achieving local control rates comparable to those of surgery. The choice depends on size and accessibility, with bone infiltrative lesions or posterior nasal cavity lesions being classically good indications for primary surgery.

We report long-term locoregional control and toxicity outcomes with low-dose-rate (LDR) or pulsed-dose-rate (PDR) brachytherapy for the primary treatment of early-stage nasal SCCs.

Methods and materials

Patients' characteristics

Clinical records of patients with newly diagnosed, histologically proven, early-stage (T1-T2N0-1) nasal SCC and treated with interstitial brachytherapy with curative intent at our institution (Gustave Roussy Cancer Campus, Villejuif, France) between December 1982 and April 2015 were reviewed. The 2009 tumor/node/metastasis classification was employed, and tumors treated before 2009 were retrospectively reclassified.

Initial patient evaluation consisted of a careful clinical examination and was complemented by radiographs, CT, and/or MRI. All nasal vestibule lesions were evaluated with at least a staging CT scan. Staging or elective neck dissection among patients with clinically N0 disease was not performed. Patients with clinically N1 disease underwent functional neck dissection. Patients with recurrent lesions, previous radiotherapy to the area, advanced tumors (T3–T4), clinical N2–3 disease, or distant metastases were excluded.

Brachytherapy procedure

The implantation was performed under general anesthesia. Interstitial needles or catheters were implanted to cover the clinical target volume, defined as the macroscopic tumor plus a safety margin of 5–10 mm, following the Paris system rules (Fig. 1). Interstitial technique was employed, either by free hand or with the aid of plastic template with regularly spaced perforations. The spacing varied from 12 to 16 mm, and the number of needles or plastic tubes was determined to allow an adequate coverage of target volumes.

Depending on the year of treatment, LDR brachytherapy with iridium-192 (^{192}Ir) wires or PDR brachytherapy with ^{192}Ir point-source was delivered. Length of iridium wires (for LDR) or positions of active dwell times (for PDR) were chosen to appropriately cover the target volume. Dose was prescribed to the reference isodose, which corresponded to 85% of the basal isodose. For PDR treatments, continuous pulses were given hourly. Removal of the implant was performed under conscious sedation.

Followup

Followup was scheduled at 4–8 weeks after brachytherapy completion and then every 3–4 months for the next 2 years, then every 6 months for the next 3 years, then annually. Followup consisted of a careful clinical examination and toxicity evaluation. Progressive growth of a persistent lesion would prompt a careful biopsy to rule out residual disease or tumor recurrence. Failures were classified according to the site of the first tumor recurrence and defined as local (failure in the nose), regional (failure in

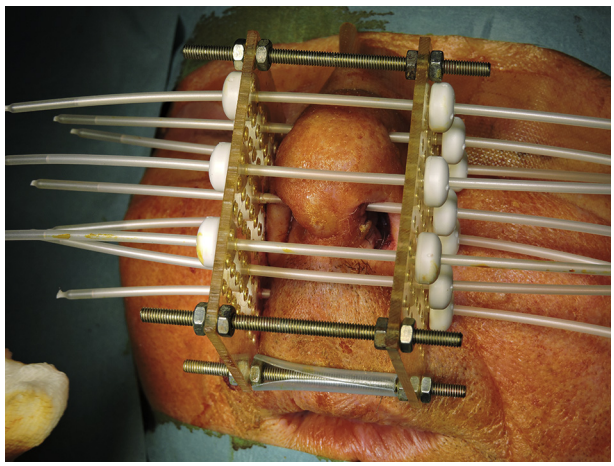

Fig. 1. Brachytherapy procedure.