

Physics

^{125}I interstitial brachytherapy for the treatment of myoepithelial carcinoma of the oral and maxillofacial region

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ABSTRACT

PURPOSE: This study evaluated the treatment of myoepithelial carcinoma (MC) of the oral and maxillofacial region with radioactive iodine (^{125}I) seed implantation.

METHODS AND MATERIALS: Twenty-seven patients with MC in the oral and maxillofacial region were treated with ^{125}I seed implantation between March 2006 and October 2012. Thirteen of the 27 patients (8/8 patients with primary disease and 5/19 patients with recurrent disease) were treated on an adjuvant setting after resections, and the other 14 patients were treated by brachytherapy after a recurrence precluding a surgical resection for salvage. The sites of the MC were the parotid for 18 patients, oral cavity for 2 patients, and base of skull for 7 patients. Recurrence-free survival (RFS), overall survival (OS) rates, and side effects were retrospectively reviewed.

RESULTS: Patients were followed for 6–105 months (median 37 months). The 3- and 5-year RFS rates were 51.9% and 46.1%, respectively. The 3- and 5-year OS rates were 68.6% and 51.5%, respectively. The OS and RFS were significantly better among the 8 patients treated upfront in comparison with the 19 patients treated for salvage at relapse. The OS was worst for the 7 patients with base of skull region disease. No severe complications were observed during followup.

CONCLUSIONS: This study showed ^{125}I brachytherapy is a feasible and effective modality for the treatment of MC. These findings should be interpreted cautiously due to the small number of patients and the relatively short followup. © 2016 American Brachytherapy Society. Published by Elsevier Inc. All rights reserved.

Keywords:

Myoepithelial carcinoma; Salivary gland tumor; Oral and maxillofacial; Iodine-125; Brachytherapy

Introduction

Myoepithelial carcinoma (MC) is a relatively rare tumor type that accounts for approximately 0.4–0.6% of all salivary gland tumors and 1.2–1.5% of salivary gland carcinomas (1, 2). Because of its rarity, the clinical and biological behavior of MC is not well characterized, although some researchers believe that MC should be classified as a high-grade malignancy (3, 4). The main treatment for MC is complete surgical excision with free margins, with or without nodal dissection (4, 5). Adjuvant radiotherapy does not seem to significantly improve prognosis (5); however, the value of chemotherapy has not yet been fully established in patients with MC.

Radioactive iodine (^{125}I) seed brachytherapy has emerged as an attractive option for improving local control (LC) in patients with malignant salivary gland tumors, as this technique can irradiate a limited area by delivering high doses of radiation directly to the tumor, while simultaneously sparing adjacent normal tissues (6–8). The objective of this retrospective report was to assess the outcome of a cohort of patients with MC of the oral and maxillofacial region who received ^{125}I seed implantation.

Methods and materials

Patients

Twenty-seven patients (15 males and 12 females) aged between 6 and 74 years who were treated between March 2006 and October 2012 were included in this retrospective study. MC was pathologically diagnosed in all patients before ^{125}I seed implant brachytherapy. Eight patients (29.6%) had primary MC; the other 19 patients (70.4%) had recurrent disease. No patients had neck lymph node

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metastases or distant metastases before ¹²⁵I seed implantation. The clinicopathological features of the patients are summarized in Table 1. The treatment plans for all cases were approved by the Ethical Committee of Peking University School and Hospital of Stomatology.

Treatment

Thirteen of the 27 patients had a tumor size less than 4 cm (8/8 patients with primary disease and 5/19 patients with recurrent disease) and underwent conservative surgical resection followed by ¹²⁵I seed implantation; the other 14/19 patients with recurrent disease had a tumor size greater than 4 cm and underwent biopsy without tumor resection followed by ¹²⁵I seed implantation.

Seed implantation treatment planning

The brachytherapy treatment plan for all patients was designed using a computerized treatment planning system (RT-RSI; Beijing Atom and High Technique Industries Inc., Beijing, China) based on computerized tomography (CT) images. The planning target volume was defined as a 10–15 mm extension of the preoperative gross tumor volume and the postoperative bed on the basis of CT scans in combination with imaging of the target area by

Table 1
Clinicopathological features of the 27 patients with myoepithelial carcinoma

| Characteristic | Number |
|---|-----------|
| Sex (n) (%) | |
| Male | 15 (55.6) |
| Female | 12 (44.4) |
| Age (y) | |
| Median | 46 |
| Range | 6–74 |
| Tumor size (cm) (%) | |
| 2–4 | 13 (48.1) |
| 4–6 | 7 (25.9) |
| ≥6 | 7 (25.9) |
| Tumor site (%) | |
| Parotid gland | 18 (66.7) |
| Primary tumor | 6 (22.2) |
| Recurrent tumor | 12 (44.4) |
| Skull base region (all recurrent) | 7 (25.9) |
| Minor salivary glands of oral cavity (both primary) | 2 (7.4) |
| Prior treatment (%) | |
| None | 8 (29.6) |
| Surgery | 14 (51.9) |
| Surgery and radiotherapy | 5 (18.5) |
| Previous surgeries (%) | |
| One | 9 (33.3) |
| Two | 5 (18.5) |
| Three or more | 5 (18.5) |
| Previous external beam radiotherapy (%) | |
| Once | 4 (14.8) |
| Twice | 1 (3.7) |
| Cumulative dose of external beam radiotherapy (%) | |
| 50~70 Gy | 4 (14.8) |
| >70 Gy | 1 (3.7) |
| Median (Gy) | 60 |

intraoperative photography. The ¹²⁵I seed activity was 0.7–0.8 mCi. The matched peripheral dose (MPD) was 90–120 Gy and was adjusted according to previous treatments and adjacent structures. The dose was prescribed as the MPD encompassing the planning target volume.

¹²⁵I seed implantation

Implantation of radioactive seeds was performed approximately 2 weeks postoperatively in all patients after wound healing had been achieved. The distribution of ¹²⁵I seeds (Beijing Atom and High Technique Industries Inc; Model 6711; *t*_{1/2}, 59.4 days; energy level, 27.4–31.4 KeV) was determined from CT scans in combination with the target area as recorded by intraoperative photographs. Based on the implantation scheme, 20–150 ¹²⁵I seeds (mean, 73) were implanted (Table 2). The space between seeds (center to center) was maintained at 10 mm. Evaluation of the postplan was routinely performed for

Table 2
Summary of treatment and outcomes for the 27 patients with myoepithelial carcinoma

| Treatment/outcome | Number |
|--|-----------|
| Treatment type (%) | |
| Surgery plus ¹²⁵ I seed implantation | 13 (48.1) |
| Primary tumor | 8 (29.6) |
| Parotid gland | 6 (22.2) |
| Minor salivary | 2 (7.4) |
| Recurrent tumor | 5 (18.5) |
| Parotid gland | 2 (7.4) |
| Skull base | 3 (11.1) |
| ¹²⁵ I seed implantation alone | 14 (51.9) |
| Parotid gland | 10 (37.0) |
| Skull base | 4 (14.8) |
| ¹²⁵ I seed activity (mCi) | 0.7–0.8 |
| Number of ¹²⁵ I seeds implanted | |
| Median | 73 |
| Range | 20–150 |
| Matched peripheral dose of ¹²⁵ I seed implantation (Gy) | |
| For patients without previous radiotherapy | 120 |
| For patients with previous radiotherapy | 90 |
| Followup (mo) | |
| Median | 37 |
| Range | 6–105 |
| Status (%) | |
| No evidence of disease | 13 (48.1) |
| Alive with disease | 3 (11.1) |
| Related death | 11 (40.7) |
| Local progression-free time (mo) | |
| Median | 23 |
| Range | 1–105 |
| Toxicities after ¹²⁵ I seed implantation (%) | |
| Skin pigmentation | 5 (18.5) |
| Skin ulceration | 1 (3.7) |
| Hearing loss | 7 (25.9) |
| Trismus | 3 (11.1) |
| Salvage treatment after relapse | |
| Surgery (neck dissection) | 3 |
| Reimplantation | 5 |
| Cause of death | |
| Local recurrence | 5 |
| Distant metastasis | 6 |

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