Brachytherapy for tongue cancer in the very elderly is an alternative to external beam radiation

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Background: The result of curative treatment for very elderly patients with tongue carcinoma has not been reported to date. We retrospectively reviewed the results of brachytherapy in 125 the patients aged over 75 years.

Methods: The results of brachytherapy in 125 patients, 75 years old or older, with Stage I or II squamous cell carcinoma of the oral tongue were reviewed. The 125 cases consisted of 31 Stage I and 94 Stage II cases; 67 patients were under 80 years old and 58 were over 80 years old. All patients were treated using low-dose-rate brachytherapy ($^{198}\text{Au}/^{222}\text{Rn}$: 59 cases; ^{192}Ir : 38 cases; $^{226}\text{Ra}/^{137}\text{Cs}$: 28 cases).

Results: None of the patients stopped treatment during the course of brachytherapy. The 3 year and 5 year control rates of the primary lesions were both 86%. Post-brachytherapy neck node metastasis was diagnosed in 43 cases and radical neck dissection was performed for 24 cases (21 of the 24 cases were under 80 years old). As a result, the 7 year disease-specific survival (DSS) rate for patients aged under 80 years old was 70% and 41% for those over 80 years old ($p=0.03$).

Conclusion: The brachytherapy for elderly patients with tongue cancer was safe, and the control of the primary lesion was almost the same as in younger patients. However, modalities available to treat neck node metastasis are limited. More conservative surgical approaches combined with post-operative irradiation may be advocated for neck node metastasis for elderly patients with tongue cancer.

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Tongue cancer predominantly occurs in older people, and patients with tongue cancer often have physical and/or psychological complications. Because of such comorbidities, most older patients are not considered candidates for curative surgery. Radiotherapy is now one of the most powerful modalities for the treatment of cancer, and several published studies have demonstrated the feasibility of radiotherapy with curative intent for every type of head and neck cancer [1, 2]. Because the use of conventional external beam radiotherapy for head and neck cancer has been reported to cause severe collateral effects, several special techniques have particular relevance to the treatment of the head and neck cancer in the elderly [1, 3, 4]. Brachytherapy is another modality that may be of relevance to the treatment of elderly patients with tongue cancer.

We have already reported our experience of the treatment of tongue cancer with brachytherapy alone or in combination with external beam radiotherapy [5–7]. However, since then no data have been reported concerning the outcome of very elderly patients with squamous cell carcinoma of the head and neck treated by brachytherapy. The aim of this study was to investigate the appropriateness of feasible curative treatment by low-dose-rate brachytherapy for early tongue cancer in patients aged over 75 years. This study was approved by the research ethics board committee.

Methods and materials

The results of brachytherapy in 125 patients, 75 years old or older, with Stage I or II squamous cell carcinoma of the oral tongue were retrospectively reviewed. All patients were staged by physical findings, CT and/or ultrasound imaging. Of these, 67 patients were under 80 years old and 58 were over 80 years old. All patients were referred for brachytherapy and treated at our hospital between 1963 and 2006, and three-quarters (95 cases) of the patients were treated in the final 10 years. The 125 cases consisted of 31 Stage I cases and 94 Stage II cases, accounting for approximately 95% of the patients in the same age group who were referred for definitive curative radiotherapy. The remaining 5% of patients were treated by external beam radiation or followed without treatment – all died of the disease. These patients had severe physical and/or psychological comorbidities and so were excluded as candidates for curative brachytherapy. The 125 patients consisted of 60 males and 65 females, and their average age at the time of their first visit was 80.2 years (range: 75–92 years). The median age was 79.7 years. All patients were treated by low-dose-rate brachytherapy ($^{198}\text{Au}/^{222}\text{Rn}$ seeds; $^{226}\text{Ra}/^{137}\text{Cs}$ needles; ^{192}Ir pins) under local anaesthesia. 59 patients were treated by less invasive permanent implantation of small $^{198}\text{Au}/^{222}\text{Rn}$ seeds, and the remaining patients were treated by temporary implantation of ^{192}Ir pins (38 patients) or hard linear $^{226}\text{Ra}/^{137}\text{Cs}$ needles (28 patients). There were no changes in the dose during the entire period of treatment, and the standard brachytherapy dose was 70 Gy in 7 days. Spacers were

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routinely prepared in the brachytherapy after 1987 to prevent osteoradionecrosis of the mandible [8].

Results

None of the patients stopped treatment during the course of brachytherapy. After brachytherapy, the patients were followed up for 24–218 months. Their median survival time and average overall survival time were 36 months and 48 months, respectively. The acute complications associated with brachytherapy (mucositis, taste and sensory disorders, etc.) were not severe enough to interfere with oral intake, and no patients required tube feeding. All of the early complications had resolved and the patients had recovered to their pre-cancer condition within 3 months after the start of brachytherapy.

Their median disease-specific survival (DSS) time was 50 months. The 3-year and 5-year primary control rates were both 86% (Figure 1). The overall 3-year and 5-year survival rates were 57% and 49%, respectively (Figure 2).

The 3-year and 5-year DSS rates were 74% and 68%, respectively. The statistical difference was calculated by the Kaplan–Meier method. The 5-year DSS rates for Stage I and Stage II were 51% and 72%, respectively, and were not significant ($p < 0.05$) (Figure 3). The 7-year DSS rates for patients aged under 80 years old and over 80 years old were 70% and 41%, respectively, and the difference was significant ($p = 0.03$) (Figure 4).

There were 20 recurrences at the site of primary lesion between 1 and 81 months (median: 8 months) after brachytherapy. There were 47 neck lymph node metastases from 1 to 57 months (median: 6 months) following brachytherapy. Partial tongue resection was performed to treat 7 out of 20 primary site recurrences, which was successful in 4 of them. Two other local recurrences were treated by additional ^{198}Au grain implantation, and one of the two cases was successful. No treatment was indicated in 11 cases of local recurrence, and all 11 patients died of the disease. Final local control at 5 years was: $T_1 = 90\%$ and $T_2 = 85\%$. Radical neck dissection was performed to treat 24 cases of neck node metastasis: 21 patients were under 80 years old and 3 patients were over 80 years old. Another 19 cases of neck node

Figure 1. Local control in the cases as a whole.

Figure 2. Overall survival in the cases as a whole.

metastasis were treated by radiation and no treatment was indicated for the remaining 4 cases of neck node metastasis. Radical neck dissection was successful in 15 (62%) out of the 24 cases, but radiation therapy with over 60 Gy in 6 weeks was successful in only 4 of the 19 cases (21%).

There were two cases of post-treatment radiation ulcer and one case of bone exposure prior to introduction of spacers, but all three patients recovered within 1 year in response to conservative treatment. No bone and/or soft-tissue complications that interfered with the patients' post-treatment life occurred after introduction of the spacers. In 22 patients, 23 post-treatment multiple cancers were diagnosed: 7 head and neck cancers, 5 lung primary cancers, 2 cancers each of the oesophagus, pancreas, kidney and haematological system and 1 cancer each of the bladder, stomach and small intestine.

Discussion

We have repeatedly encountered more serious physical and psychological comorbidities when treating the head and neck cancers in our ageing society. Owing to the adverse effects of treatment with external irradiation, patients with head and neck cancer experience bouts of serious illness, debility and numerous symptoms including pain, dysphagia, weight loss and xerostomia [9, 10].

Figure 3. Overall disease-specific survival (DSS) in the cases as a whole.

Figure 4. Cause-specific survivals of patients with tongue cancer at Stage II. ys, years.

However, most early and late complications of brachytherapy for tongue cancer are limited to the area treated, and patients recover in several months [4, 5, 8]. There is a report that age is a factor influencing the outcome of tongue cancer treatment [11]. The brachytherapy in our study was performed safely and the control of Stage I and Stage II primary tongue cancer in patients 75 years old and over was almost the same as in younger patients. However, the salvage modalities available to treat recurrence were limited and the results of radiation treatment were not as good as in the younger patients [5, 7]. The results of this study indicate that age itself should not be included in determinations of the indications for brachytherapy as curative primary treatment for tongue cancer. Elderly patients with oral tongue cancer can benefit from curative brachytherapy and contraindications should be based on the physical and psychological status of the individual patients, as with younger patients [12–14]. Less invasive brachytherapy tools, such as ^{198}Au grains rather than long linear ^{192}Ir or ^{137}Cs sources, can be used to treat elderly patients with physical or mental disabilities who are contraindicated for surgical treatment. By providing comprehensive care to patients with malignancies of the head and neck, clinicians can increase the likelihood that patients and their families will be able to obtain the best possible outcomes [15].

Now that good local control of tongue cancer has come to be expected for elderly patients, treatment of neck node metastasis following successful brachytherapy for tongue cancer has become the main problem [6]. Conservative surgery with post-operative irradiation can be advocated for neck node metastasis of elderly patients with both tongue cancer and cardiopulmonary complications. Good control of subsequent neck node metastasis requires early diagnosis of the metastasis. Approximately 80% of post-brachytherapy neck node metastases of tongue cancer occur within 12 months of treatment, and positron emission tomography/CT scans

can be recommended for early diagnosis of neck node metastasis and second primary cancers in the upper aerodigestive tract [6, 16].

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