

External radiotherapy and HDR Ir-192 brachytherapy boost in primary tracheal tumors

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Primary tracheal tumors are rare and often diagnosed after regional or distant metastasis has occurred. The prognosis is generally poor with overall survival of 10-20% at two years. The primary treatment is surgical resection of the tumor. Radiotherapy is usually employed in inoperable cases or as an adjunct treatment to surgery. Between 1994 and 1998, eight patients with primary tracheal tumors were treated with curative intent. There were six male and two female patients who were aged between 34 and 74 (median 61) years with a minimum Karnofsky performance status score of 90. The histopathologic subtype of the lesion was squamous cell carcinoma in four and adenoid cystic carcinoma in four cases. Location of the tumor was mostly on distal trachea that was in four patients and median tumor extent was three cm. Seven patients received a total dose of 50 Gy; one patient who did not accept brachytherapy was given 60 Gy external beam irradiation. Endobronchial high dose rate (HDR) brachytherapy was prescribed as 15 Gy in 3 fractions. The median survival in this group of patients is 15 months. All patients were evaluated as in complete remission, after completion of treatment. However, locoregional relapse was seen in five patients after a median of 14 months (5.5-22 months) of radiotherapy. Four patients who experienced locoregional failure had originally received brachytherapy as a boost. The remaining patient was the one only treated by external irradiation. We have not seen any treatment related major complication. Our data show that addition of brachytherapy increases complete remission rate without significant increase in serious toxicities. [Turk J Cancer 2000;30(2):75-80]

Key words: Radiotherapy, brachytherapy, primary tracheal tumors

Primary tracheal tumors are rare, constituting 0.2-0.5% of all respiratory tract malignancies and accounts for less than 0.1% of the cancer deaths per year (1-3). Tracheal tumors are often diagnosed late in their clinical course at an advanced stage. Due to rarity of this malignancy, the experience is limited and optimal management is undefined.

Advances in surgical technique during recent years have made surgery as the primary treatment of choice with reported 5-year survivals of 20-40% for squamous cell carcinomas and 60-100% for adenoid cystic carcinomas (2,4,5). The role of radiotherapy has generally been limited to postoperative settings or as the primary modality in unresectable disease (3,4). By new approaches like combined external and endoluminal radiotherapy, it is now possible to increase the tumour dose, with minimal treatment morbidity by sparing the normal surrounding tissues.

In this retrospective study, we report our experience with external radiotherapy and HDR brachytherapy in treatment of patients with primary tracheal tumors.

Patients and Methods

Between 1994 and 1998, eight patients with primary tracheal tumors were treated with curative intent at Hacettepe University, Department of Radiation Oncology. Patient characteristics and results are summarized in table 1. There were 6 male and 2 female patients who were aged between 34 and 74 (median 61) years with a minimum Karnofsky performance status score of 90. All of them were diagnosed by bronchoscopic biopsy. The histopathologic subtype of the lesion was squamous cell carcinoma in four and adenoid cystic carcinoma in four cases.

One patient (case 3) was medically inoperable and two (cases 5 and 8) did not accept the surgery. Remaining five patients were assessed beyond the surgical limits. Location of the tumor was mostly on distal trachea in four patients and median tumor extent was 3 cm (2-5.5 cm).

Seven patients received a total dose of 50 Gy with external beam irradiation by Co-60 or 6 MV linear accelerator in conventional fractions. One patient who did not accept brachytherapy was given 60 Gy externally. Radiotherapy volume included bilateral supraclavicular and mediastinal lymphatics beside primary tumor bed.

Endobronchial high dose rate (HDR) brachytherapy was given as a boost technique after external beam radiotherapy regardless of response. A total dose of 15 Gy was given in 3 fractions, once a week. Brachytherapy was prescribed to 10 mm from the source and initial gross tumor extension plus 1 cm security margin in both directions was taken as a clinical target volume.

Four patients have received diverse course and cycles of cisplatin-based chemotherapy. All patients were evaluated by chest radiogram, computerized tomography of thorax in suspicious conditions and fiberoptic bronchoscopy during follow-up. Bronchoscopic evaluation could not be done in patients who did not accept bronchoscopy.

Table 1
Patient characteristics, treatment data and results of patients

| Patient no. | Sex | Histopathology | Mediastinal Lymph Node Involvement | Dose of ERT (Gy) | HDR BRT | Chemotherapy | Locoregional Recurrence (month after RT) | Distant Metastasis | Follow up (months) | Status |
|-------------|-----|----------------|------------------------------------|------------------|---------|--------------|--|--------------------|--------------------|----------|
| 1 | M | ACC | + | 50 | + | - | 5.5 | - | 14 | exitus |
| 2 | M | ACC | + | 50 | + | - | - | - | 12 | exitus * |
| 3 | M | SCC | + | 50 | + | + | - | - | 15 | AWOD |
| 4 | F | SCC | + | 50 | + | + | 14 | + | 17 | exitus |
| 5 | M | ACC | + | 50 | + | + | 18 | + | 38 | AWOD |
| 6 | M | SCC | - | 60 | - | + | 7 | + | 7 | exitus |
| 7 | M | SCC | + | 50 | + | - | 22 | + | 34 | exitus |
| 8 | F | SCC | + | 50 | + | + | - | - | 15 | AWOD |

ERT: External radiotherapy, BRT: Brachytherapy, ACC: Adenoid cystic carcinoma, SCC: Squamous cell carcinoma, AWOD: Alive without disease, AWD: Alive with disease

*Died due to other cause

Results

All patients were followed at least for 15 months. Five patients had died by the closeout date, 4 due to malignancy, and 1 due to other reason (traffic accident). The median survival of patients is 15 months. All patients with lymphatic involvement (n=5) developed distant metastasis in follow-up and died within a median of 14 months (7-34 months). Three patients without lymphatic involvement are alive, one with disease and other two without evident disease. Only one patient with adenoid cystic carcinoma is living more than 3 years with locoregional relapse at 18 month whom was also treated by surgical resection. After resection, pulmonary metastasis was detected in this patient.

All patients were evaluated as in complete remission, after completion of treatment. However, locoregional relapse was seen in 5 patients after a median of 14 months (5.5-22 months) of radiotherapy. Four patients who experienced locoregional failure had originally received brachytherapy as a boost. The remaining patient was the one only treated by external irradiation. We have not seen any treatment related major complication.

Discussion

Primary tracheal tumors are rare and often diagnosed after regional or distant metastasis has occurred. The prognosis is generally poor with overall survival of 10-20% at two years (2,5,7,8). The primary treatment is surgical resection of the tumor. Radiotherapy is usually employed in inoperable cases or as an adjunct treatment to surgery.

Chao et al. (9) reported their experience on 42 patients who were treated by definitive radiotherapy. The author concluded that performance status, weight loss and regional or distant metastases are significant prognostic factors. Jeremic et al. (10) and Mornex et al. (11) also found performance status as an important prognostic factor on their analysis of 22 and 84 patients respectively. Adenoid cystic histology, lymph node involvements are other reported prognostic factors. Schraube et al. (12) reported a median survival of 10.1 months for mediastinal lymph node involvement whereas 33 months for those without. Although our sample size is small, we found 14 months of median survival in cases with mediastinal lymph node metastasis. Slightly better survival in our patients may be due to good performance status.

Although there is evidence that increased radiation dose especially above 60 Gy has a positive impact on outcome, adjustment for prognostic factors were not performed in most of studies. Jeremic et al. (10) adjusted prognostic factors when considering the effect of dose on local control. The author reported that there was a slightly better prognosis in patients receiving 70 Gy when compared to 60 Gy. However the difference between groups was not statistically significant. Similar results are also reported by Chao et al. (9). The author has reported no significance of radiation dose on local control and survival when other prognostic factors are taken into account. However, there are increased late toxicities mostly in the form of tracheitis in high dose groups in both studies.

The use of endobronchial brachytherapy has generally been limited to a palliative setting with encouraging reports of local palliation following recurrence after postprimary radiation therapy. Boedker et al. (13) and Percaprio et al. (14) reported increased local control in their recurrent patients. The authors did not report any increase in complications.

Recently Harms et al. (15) reported their experience on seven patients given primary combined external beam radiation (46-52 Gy) and HDR brachytherapy (15-20 Gy). Intraluminal brachytherapy has employed as a boost regimen only in case of residual tumor after external beam irradiation. The author has reported median survival of 34.3 months and complete remission in five patients. Three patients suffered from late toxicity, which were in form of tracheitis in two and hemorrhage in one. Schraube et al. (12) reported complete response in two and partial response in one patient who received combined external beam therapy of 46-50 Gy and HDR brachytherapy of 15-20 Gy. The author reported severe tracheitis in two of four patients. We used endobronchial brachytherapy as a boost technique over external beam irradiation. Although our brachytherapy schedule is 3x5 Gy that is similar to Harms and Schraube's reports, we have not seen any serious complication in our patients. This may be due to good performance status of our patients.

Due to rarity of tracheal tumors, optimal dose of radiation and the role of endoluminal brachytherapy have not been determined yet. However, addition of brachytherapy in selected cases, especially good prognostic patients may bring some benefit. Our data show that addition of brachytherapy increases complete remission rate without significant increase in serious toxicities. Prospective randomized studies are required to optimize radiation treatment and endoluminal brachytherapy.

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