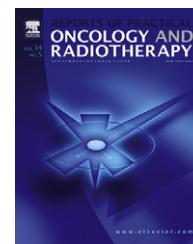


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Original article

Tracheal cancer: Role of radiation therapy

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ABSTRACT

Purpose: To assess the results of tracheal cancer patients treatment and factors influencing prognosis.

Background: Primary malignant neoplasms of the trachea are rare. The treatment of choice for tracheal carcinomas is resection. Radiation therapy is recommended as a part of radical treatment or for palliation of symptoms.

Materials and methods: Between 1962 and 2006, 50 patients diagnosed with tracheal cancer were treated at the Centre of Oncology in Krakow. The analysis focused on locoregional recurrence-free survival (LRRFS), disease free survival (DFS) and overall survival (OS). Survival rates, univariate and multivariate analyses of prognostic factors were performed using the Kaplan–Meier method, the log rank test and Cox's proportional hazard method, respectively.

For over 40 years, patients were treated using different modalities: surgery followed by radiotherapy (6%), radiotherapy (78%), chemoradiotherapy (8%), and symptomatic treatment (8%).

Results: The 5-year LRRFS was 18%, DFS was 15% and OS was 17%. gender (favoured females) was the only prognostic factor for LRRFS. For OS, the independent prognostic factors were performance status (favoured Karnofsky higher than 80), stage and year of start of the treatment (later than 1988 vs. earlier – 5-year OS 20% vs. 12%).

5-year OS in the following (strongly differentiated over the time) treatment modalities were: surgery followed by radiotherapy (66%), radiotherapy (16%), chemoradiotherapy (0%), and symptomatic treatment (0%).

Of 44 patients treated with radiotherapy symptomatic partial response was observed in 32 patients and follow-up imaging studies revealed complete response in 5 patients, partial response in 25, stable disease in 4 or progressive disease in 4.

Conclusions: Radical treatment in patients in early stage and good performance status seems to be correlated with the improvement of survival. However, despite the fact that results of treatment are poor, radiotherapy offers symptomatic improvement.

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1. Introduction

Malignant tumors of trachea constitute a rare diagnosis accounting for less than 0.1% of all malignancies.¹ Since there are no specific respiratory signs and symptoms of the disease, potentially resectable and curable, the diagnosis is considerably delayed until an advanced stage, which a priori deteriorates the prognosis.

The published studies carried out until now allow to indicate some well defined prognostic factors such as histological subtype – adenoid cystic carcinoma (ACC), early stage disease, complete resection and negative surgical airway margins.^{2,3}

Because there are no guidelines based on randomized clinical trials, the choice of treatment modalities and optimal sequence remains an open-ended question. In daily practice, the most frequently applied is surgery with optional post-operative radiotherapy with up to 52% 5-year overall survival in ACC and 39% in SCC.^{2,4}

Radiotherapy plays a significant role as a part of radical combined treatment as well as a palliative approach.^{5,6}

As there are no randomized clinical trials conducted (due to the low incidence of tracheal cancers) so far, we present another retrospective data evaluating prognostic factors and treatment outcome contributing to the knowledge about this neoplasm.

2. Materials and methods

This analysis has been performed in the group of 50 patients with tracheal cancer who were treated at the Centre of Oncology in Krakow between 1962 and 2006. Characteristics of patients are shown in Table 2. Median age was 56 years (range 25–77), 31 patients were male, 19 were female. All patients presented symptoms preceding diagnosis of cancer, most common of them being dyspnoea, cough and hemoptysis. A substantial majority of diagnoses were based on very simple diagnostic tools, e.g. bronchoscopy and chest X-ray, and only the patients treated from the 1990s had additional chest computed tomography. In all the cases diagnosis was confirmed by histology examination and the most common histological type was squamous cell cancer observed in 48%. The distribution of all histological types is shown in Table 2.

Patients were treated using different treatment modalities: surgery followed by radiotherapy (6%), radiotherapy alone (78%), chemoradiotherapy (8%), and symptomatic treatment (8%).

Of 46 irradiated patients, 26 were treated with radical and 20 with palliative intent. Median external beam radiotherapy dose was 6400 cGy (range 5600–7000) and 3500 cGy (range

Table 2 – Characteristics of patients.

Characteristics	n	%
Age		
Median		56
Range		25–77
Sex		
Female	19	38
Male	31	62
Performance status (Karnofsky)		
<80	35	70
≥80	15	30
Histological subtype		
Squamous cell carcinoma	24	48
Adenoid cystic carcinoma	5	10
Adenocarcinoma	6	12
Nondifferentiated	2	4
Small cell carcinoma	4	8
Ca solidum	3	6
Others, unknown	6	12
Stage		
I	5	10
II	21	42
IIIA	18	36
IIIB	5	10
IV	1	2
Type of treatment		
Surgery followed by radiotherapy	3	6
Radiotherapy alone	39	78
Chemoradiotherapy	4	8
Symptomatic treatment	4	8
Radiotherapy		
Without radiotherapy	4	8
Palliative	20	40
Radical	26	52
Year of start of treatment		
1962–1988	22	44
1989–2006	28	56

2000–4000), in radical and palliative treatment respectively, while in brachytherapy cases it was 15 Gy in two fractions. In radical treatment, dose per fraction ranged from 180 to 200 cGy, while in palliative treatment it ranged from 300 to 400 cGy.

Radiotherapy was delivered by linear accelerator (24 pts.), cobalt (20 pts.) and HDR brachytherapy (2 pts.).

Radiotherapy techniques changed during the period of this analysis.

In the radical treatment two antero-posterior or three oblique fields techniques were used in the first phase, with limitation of the dose to the spinal cord to 45 Gy, using two or three oblique fields in the second phase. Irradiated volume in the first phase included trachea with tumor and enlarged lymph nodes, upper mediastinal lymph and/or cervical nodes electively, in second phase tumor or tumor bed with margins only. Until 1995 two-dimensional (2D) treatment planning was used. From 1996 computed tomography was incorporated into the planning system at the Centre of Oncology in Krakow.

Palliative treatment included tumor and enlarged lymph nodes with margin, mostly in 2D treatment planning setting.

Brachytherapy dose was specified at 1 cm from the axis of the catheter.

All four patients in combined modality group (chemoradiotherapy) received etoposid and cisplatin after radiotherapy.

Table 1 – Proposal of staging system.

Stage
I – limited to trachea
II – limited to chest
IIIA – limited to chest + mediastinal lymph nodes involvement
IIIB – limited to chest + supraclavicular lymph nodes involvement
IV – metastatic disease

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