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**Importance of age and co-morbidity for the outcome of radiotherapy in head and neck cancer: A population based study**

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**Purpose**

Head and Neck Cancer (HNC) patients are often long-term users of tobacco and/or alcohol. Besides the carcinogenic effect of these substances they also lead to other chronic diseases and thus contribute to a high prevalence of comorbidities among HNC patients. Due to demographic changes, the general population becomes older and consequently more HNC patients may suffer from comorbidity. Severe comorbidity may impact on the prognosis of HNC and may affect treatment decisions and subsequent outcome. This study describes comorbidity in a large cohort of Danish HNC patients, the variation with increasing age and the prognostic impact on survival.

**Materials and methods**

The DAHANCA database contains information on all HNSCC-patients in Denmark from 1971 to 2008. We conducted a nationwide retrospective register based cohort study on all patients with HNC in Denmark in the period 1992 to 2006 (12,596 patients). The database includes information on tumor morphology, patient characteristics, treatment, and complete follow up. Information on comorbidity prior to diagnosis of HNC was obtained from the National Patient Registry which contains discharge diagnoses from all hospital admissions and outpatient visits in Denmark. This data was adapted to the Charlson Comorbidity Index (CCI) and scored in four groups (0, 1, 2, and 3+). Kaplan Meier estimates were used to obtain 5-year crude overall survival based on level of comorbidity and to quantify the impact of comorbidity on mortality we used Cox's proportional hazards regression.

**Results**

Among the 12,596 patients the mean age was 62 years and 73% was men. 37 % of the patients were diagnosed with pharyngeal carcinoma, 33 % with laryngeal carcinoma and 30% with oral carcinoma. 44% had comorbidity according to CCI: 18% with score 1, 11 % with score 2 and 15% with score 3+. The most common comorbidities were cerebro-vascular disease (11%), Chronic Pulmonary Disease (11%) and cardiovascular disease (10%). Increasing age was significantly associated with increasing CCI score. There was no significant difference in CCI score between genders. Survival rates were significantly associated with level of comorbidity and in a Cox proportionate multivariable analysis risk of death was independently associated with comorbidity (HR of 1.16 [95 % CI 1.08;1.25], 1.34 [1.22;1.46], 1.63 [1.51;1.80] for patients with CCI score 1, 2, and 3+, respectively), advanced T-stage (2.05[1.94-2.16]), nodal disease (1.48 [1.39-1.57]), and age >60 years (1.41[1.33-1.49]).

**Conclusion**

Comorbidity is common among HNC patients and reflects the etiology of the disease. Comorbidity is a negative prognostic factor for overall survival and must be considered in prognostic staging of patients with HNC. As the general population becomes older critical assessment of comorbidity can significantly improve the decision-making process for clinicians and may influence and improve patient outcomes. Therefore, comorbidity should be added to the TNM system to be a more reliable and valid assessment of survival.