Dysphagia-related morbidity in head and neck radiotherapy

Head and neck cancer is primarily treated with radiotherapy, often in combination with other treatment modalities. Since the results of radiotherapy for head and neck cancer has improved over the years, chronic side effects has become increasingly important. One of the predominant side effects is dysphagia. Swallowing is a complex process involving many critical structures and radiotherapy (RT) may cause damage to many of these, including sensory and motor nerves, muscles, glands, joints and connective tissue. A significant proportion of patients may consequently experience dysphagia after treatment or the treatment may increase the frequency, severity and clinical manifestations of disorders present before treatment.

The aim of this thesis was to establish further knowledge on the factors contributing to radiation induced dysphagia in order to select the patients who may benefit from prophylactic procedures like dysphagia-sparing IMRT or swallowing exercises.

The phd thesis is based on five original papers and an overview


The prevalence and peak incidence of acute and late normal tissue morbidity was studied in a large prospective trial. Accelerated radiotherapy increased acute morbidity including acute dysphagia but all acute reactions were reversible and healed within three months after radiotherapy. Accelerated radiotherapy did not increase late dysphagia or other late side effects.


Risk factors for acute and late dysphagia were examined in the same cohort as paper 1. Prognostic models were established to characterize patients who were at risk of developing acute or late dysphagia after RT and we found that the following parameters were significant independent factors for severe acute dysphagia: T3-T4 tumors, N-positive, non-glottic cancer, age >62 years, baseline dysphagia > 1 and accelerated radiotherapy. The following factors were prognostic factors for late dysphagia: non-glottic cancer, T3-T4 and baseline dysphagia > 1.


In a cohort treated with IMRT at the Department of Oncology, Aarhus University Hospital 2006-2010 the prevalence of severe dysphagia was 32%. A total of 18 patients developed aspiration pneumonia corresponding to a cumulative incidence proportion 5.3 % for the first year after radiotherapy.

Paper 4: Mortensen HR, Jensen K, Aksglæde K, Behrens M, Grau C: Late dysphagia after IMRT for head and neck cancer and correlation with dose-volume parameters. Accepted for publication in Radiotherapy&Oncology

A group of 65 patients treated with IMRT from 2006-2010 was thoroughly examined with objective swallowing examination (Modified Barium Swallow, MBS), quality of life questionnaires and Dahanc dysphagia scores. Significant relationships between dysphagia measures and radiotherapy dose-volume characteristics were found for specific organs at risk but the study showed that dysphagia is not sufficiently described using a single endpoint.


In a phase II trial 44 patients were randomized to ± prophylactic swallowing exercises. Patients were followed for one year past treatment. Compliance was moderate and dropouts were concerning in both groups. The trial will be evaluated before submission of the thesis.

In conclusion this phd project has shown that dysphagia is a complex morbidity not sufficiently described using a single endpoint but prognostic factors were established and relationships between dysphagia measures and dose-volume characteristics were found for specific organs at risk. Unfortunately prophylactic treatment with swallowing exercises seems to be ineffective.