

Radiation-induced dysphagia in head and neck cancer – risk structures and methodological aspects

Akademisk avhandling

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av

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Avhandlingen baseras på följande delarbeten

- I. **Hedström J***, Tuomi L*, Andersson M, Dotevall H, Osbeck H, Finizia C (2017). Within-Bolus Variability of the Penetration-Aspiration Scale Across Two Subsequent Swallows in Patients with Head and Neck Cancer. *Dysphagia*, 32(5): 683-690.
- II. **Hedström J**, Tuomi L, Finizia C, Olsson C (2017). Correlations between patient-reported dysphagia screening and penetration-aspiration scores in head and neck cancer patients post-oncological treatment. *Dysphagia*, 33(2), 206-215.
- III. **Hedström J**, Tuomi L, Finizia C*, Olsson C* (2019). Identifying organs at risk for radiation-induced late dysphagia in head and neck cancer patients. Manuscript submitted.
- IV. **Hedström J**, Johansson M, Olsson C, Tuomi L*, Finizia C* (2019). Quality of care in dysphagia patients – translation and validation of the SWAL-CARE questionnaire. Manuscript submitted.

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**SAHLGRENKA AKADEMIN
INSTITUTIONEN FÖR KLINISKA VETENSKAPER**



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Abstract

Background/Aims: Swallowing difficulties are common after radiation therapy (RT) in head and neck cancer (HNC). The overall aim of this thesis was to address radiation-induced late dysphagia with regard to investigating anatomical risk structures related to the development of radiation-induced dysphagia, as well as methodological aspects in the evaluation of swallowing. Another objective was to translate and validate the quality of care instrument Swallowing Quality of Care questionnaire (SWAL-CARE) in a mixed Swedish dysphagia population.

Methods: The studies were conducted at the Sahlgrenska University Hospital and included patients from the otorhinolaryngology clinic. In study I-III, patients who had received curative (chemo)RT for HNC underwent a videofluoroscopic examination of swallowing function (VFS) 6-36 months post-RT. Dysphagia severity was measured according to the Penetration-Aspiration Scale (PAS). All patients answered questions regarding difficulties when drinking, eating, swallowing and coughing when eating/drinking (DESdC). **Study I** included 38 patients, and the VFS protocol included six boluses of different consistencies and sizes and two swallowing attempts per bolus. Comparisons were made regarding differences in PAS score between the first and second swallowing attempt for the respective boluses. **Study II** included 118 patients, and associations between DESdC and PAS scores were determined. **Study III** included 90 patients with delineation of potential risk structures for radiation-induced dysphagia. Associations between radiation dose and dysphagia severity were evaluated and relevant dose predictors were identified. In **Study IV**, translation and validation of the SWAL-CARE was performed. Field testing was conducted including 100 patients with oropharyngeal dysphagia.

Results : In **Study I**, no differences were found between the first and second swallow attempt in VFS regarding PAS score, however large intra-individual dispersion was found. In **Study II**, a discrepancy regarding the severity of self-reported swallowing difficulties and instrumentally measured dysphagia was found. However, half of the patients who reported occurrence of at least three dysphagia symptoms (DESdC) also demonstrated high PAS score (≥ 6). In **Study III**, the mean dose to the epiglottis had the best discriminative ability for severe dysphagia ($PAS \geq 6$). Doses to the larynx and the contralateral submandibular gland as well as the parotid gland were also of importance. In **Study IV**, the validation of the S-SWAL-CARE demonstrated high validity and good internal consistency.

Conclusion: In order to test the swallowing safety, the highest PAS score should be reported in VFS. Furthermore, if a patient reports difficulties eating, drinking and swallowing when asked direct questions it is likely that the patient will present with moderate to severe dysphagia according to PAS. In addition to established dysphagia organs-at-risk (OARs), our data suggest that epiglottic and submandibular gland doses are important for swallowing function post-RT. Last, the S-SWAL-CARE can be considered a reliable and valid tool to assess the dysphagia-related quality of care.

Keywords: head and neck neoplasms; radiation therapy; dysphagia; videofluoroscopy; Penetration-Aspiration Scale (PAS); patient-reported outcomes (PRO); Quality of Care; validation studies.