Dose accumulation of daily adaptive plans to decide optimal plan adaptation strategy for head-and-neck patients treated with MR-Linac

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INTRODUCTION

- Treatment with the 1.5 Tesla MR-Linac
  - Daily online plan adaptation
  - Simultaneous tumor imaging with MRI
- Two adaptation approaches:
  - Adapt-to-position (ATP)
  - Adapt-to-shape (ATS)
- Analyze accumulated dose received by patients treated with the ATP approach on an MR-Linac:
  - To create dosimetric criteria for sub-disease sites of HN patients to assist clinicians in choosing proper daily adaptation methods
  - To evaluate whether an ATS approach should be used for a specific sub-disease site
- Evaluate prediction accuracy of actual OAR dose during a treatment course to determine how soon the ATS approach should be performed to achieve better dosimetric goals

METHODS AND MATERIALS

- Patient data (Table 1)
  - Eight HN patients treated on MR-Linac
  - Selection criteria
    - Long treatment course
    - ATP approach for daily plan adaptation
    - At least one OAR near the treatment target
    - Four sub-disease sites for analysis
      - Sinus
      - Tonsil-hypopharynx (TH)
      - Base of tongue (BOT)
      - True vocal cord (TVC)
- Dose deformation

DISCUSSION

- Results demonstrate that the ATS approach is best for BOT patients
  - Most OARs receive substantial dose
  - Setup uncertainty and daily anatomy changes greatly affect OAR dose
  - ATS can optimize dose delivered to these OARs
- Study of dose prediction in a treatment course helps determine the OAR to be used in each sub-disease site to trigger ATS approach if necessary
  - Serial structures are more sensitive to setup uncertainties
- A notable limitation of this study is the number of patients in each sub-anatomical site
- Further research should optimize a combination of ATP and ATS approaches to balance treatment efficiency and accuracy

REFERENCES