Proton Therapy in adenoid cystic carcinoma at the West German Proton Therapy Center Essen (WPE)

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Introduction & Objective

Proton therapy (PT) is used for the treatment of adenoid cystic carcinoma as it has the potential to restrict radiation doses to the target volumes while sparing organs at risk. We report early data on feasibility and outcome after PT.

Methods

Between June 2015 and August 2017, 21 patients (20 adults, 1 child; 15 male, 6 female), median 56.8 years (range, 11.3-81.5 years) with adenoid cystic carcinomas (ICD-O-3 morphological code 8200/3) were included in the prospective register studies at WPE. Neoplasms originated from paranasal sinus (42.9%), glandula (gl.) parotis (14.3%), oral cavity (14.3%), nasopharynx (9.5%), gl. lacrimalis (9.5%), nasal cavitiy (4.8 %) and gl. submandibularis (4.8%). Two patients were treated for a recurrence in the brain, or in the paranasal sinus, respectively. One patient presented with disseminated disease (lung). In 57.1% of the cases, patients were presenting with skull base infiltration. Two patients received concomitant chemotherapy, one due to his young age, one due to squamous cell carcinoma differentiation. PT was delivered as definitive (52.4%), adjuvant (42.9%) or palliative (4.8%) treatment. Beam design is depicted in fig. 3. In 2 patients neck nodes were irradiated. Either pencil beam (57.1%) or uniform scanning (38.1%) or both (4.8%) was used. Fig.1 shows a dose plan for an adenoid cystic carcinoma of the paranasal sinus of an adult patient. Median applied dose was 70 Gy (range, 60-71 Gy), administered in daily fractions of median 2 Gy (range, 1.65-2.2 Gy), 5x/week. Side effects were documented according to CTCAE v4.0 before, during and after PT.

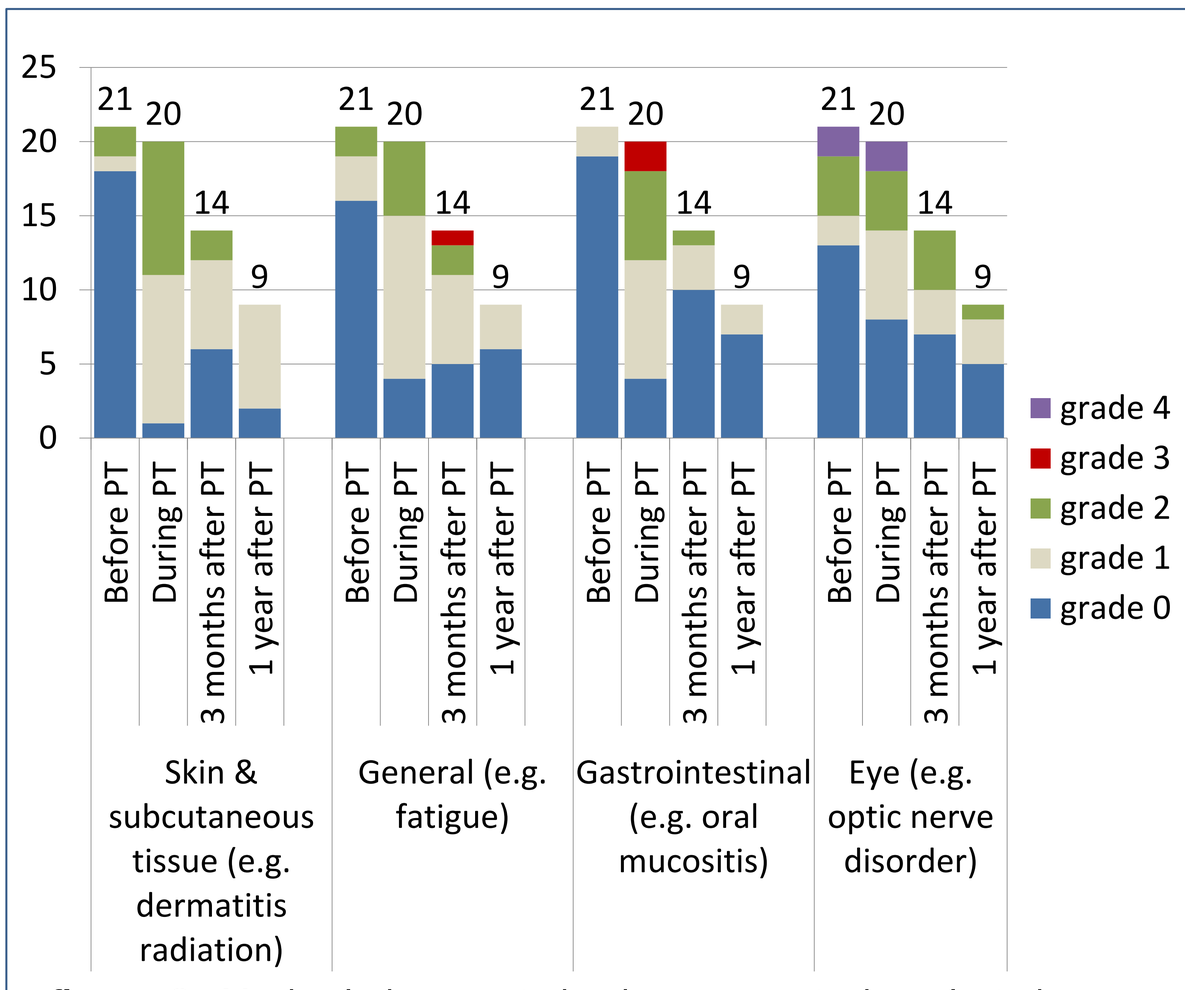

figure 2. Maximal documented adverse events in selected organ classes before, during and after PT according to CTCAE v4.0.

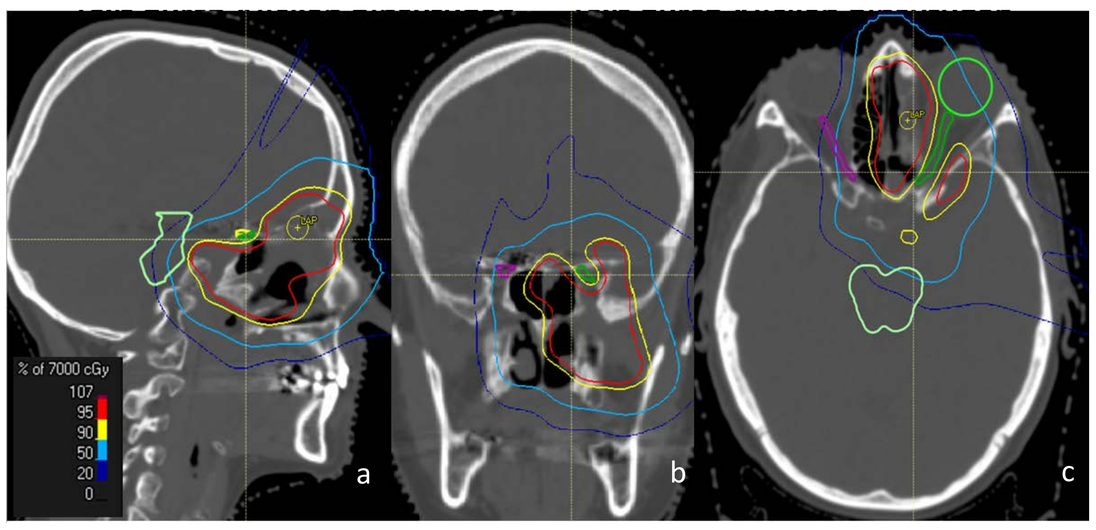

figure 1. Pencil Beam Scanning dose plan of an adenoid cystic carcinoma of the paranasal sinus in sagittal (a), coronal (b) and transversal view (c) (total dose 70 Gray). Sparing of OARs, especially left n. opticus. Image from therapy planning system RayStation® version 6.1.1, Raysearch, Sweden.

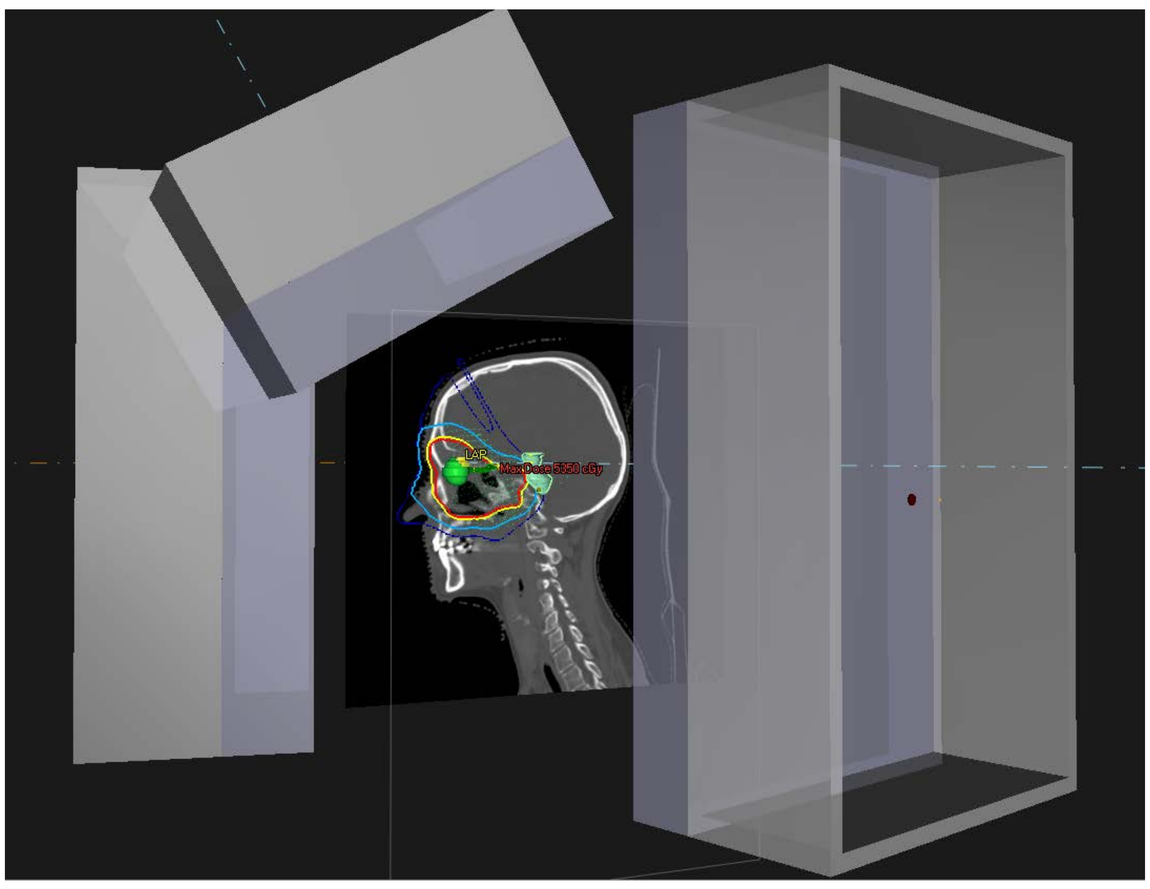

figure 3. Beam design of PTV1 (PTV1 dose of 50 Gy) with 3 fields in a patient with adenoid cystic carcinoma (same patient as in fig.1).

Results

Median follow-up (FU) time after last fraction was 0.9 years (range, 0.0-1.7 years). Maximal documented adverse events before, during and after PT can be seen in fig. 2. During PT, dermatitis radiation, oral mucositis and fatigue of grade 2 were documented in 9, 6 and 4 patients, respectively. In 2 patients, oral mucositis grade 3 toxicities occurred. In 2 patients, preexisting grade 4 optic nerve disorders were reported already before PT. 90.5% of patients finished PT without interruption of more than three days. Three months after PT, FU data was available on 14 patients. One patient presented with a grade 3 fatigue. One year after PT, data on 9 patients was available. No grade 3 or 4 toxicity was documented. Tumor control was achieved in 95.2% (n=20) of the patients. One patient developed osseous dissemination. So far, all patients are alive.

Conclusions

Early experiences suggest that PT is effective and feasible for the irradiation of adenoid cystic carcinoma. Data on acute and late toxicity is promising. However, longer follow-up and a larger cohort is needed to evaluate outcomes and toxicities on the long term.

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