OC-0341: Robustness of swallowing-sparing proton therapy for head and neck cancer
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DOI:
10.1016/S0167-8140(15)32647-5

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2013

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):

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on the mean parotid gland and SWOAR dose on CT, was relatively small. Dose changes in OARs were mainly caused by changes in patient geometry during the interval between CT0 and CT1.

### Results:

<table>
<thead>
<tr>
<th></th>
<th>CT0</th>
<th>IMPT</th>
<th>IMRT</th>
<th>IMPT</th>
<th>IMRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipsilateral parotid</td>
<td>35.4 (19.9)</td>
<td>32.2</td>
<td>22.0</td>
<td>39.2</td>
<td>31.3</td>
</tr>
<tr>
<td>Contralateral parotid</td>
<td>15.5 (6.9)</td>
<td>12.1</td>
<td>6.3</td>
<td>16.1</td>
<td>7.5</td>
</tr>
<tr>
<td>Supraclavicular</td>
<td>57.3 (16.8)</td>
<td>54.3</td>
<td>21.9</td>
<td>57.5</td>
<td>16.4</td>
</tr>
<tr>
<td>Subglottic larynx</td>
<td>59.1 (7.6)</td>
<td>50.3</td>
<td>7.8</td>
<td>58.8</td>
<td>6.8</td>
</tr>
<tr>
<td>Ipsilateral parotid</td>
<td>51.1 (11.8)</td>
<td>47.2</td>
<td>5.4</td>
<td>51.7</td>
<td>7.2</td>
</tr>
<tr>
<td>Contralateral parotid</td>
<td>22.3 (10.2)</td>
<td>14.5</td>
<td>11.1</td>
<td>23.4</td>
<td>12.3</td>
</tr>
<tr>
<td>Supraclavicular</td>
<td>25.1 (10.1)</td>
<td>55.9</td>
<td>45.3</td>
<td>58.5</td>
<td>54.9</td>
</tr>
<tr>
<td>Subglottic larynx</td>
<td>49.3 (9.8)</td>
<td>43.3</td>
<td>24.9</td>
<td>49.7</td>
<td>21.1</td>
</tr>
</tbody>
</table>

Mean dose values with simulation of an on-line position correction

### Conclusions:

With conventional PTVM-margin based planning, IMPT would be less robust to geometrical changes than IMRT, resulting in reduced gains with regard to the mean dose delivered to OARs on CT. Adaptive CTV-based treatment strategies are expected to fully exploit the benefits of IMPT, especially for patients with large geometrical changes. This study defines a reference to quantify the benefit of these proton strategies.

**OC-0342**

*Anatomical changes in mesothelioma patients: effect on proton dose distributions and benefits of early replanning*

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**Purpose/Objective:** To evaluate the dosimetric effects of anatomy changes in patients affected by malignant pleural mesothelioma (MPM) on intensity modulated proton therapy (IMPT) plans and 2) to propose an approach to mitigate this effect.

**Materials and Methods:** The study was based on the planning CT and either 3 or 4 verification CT scans acquired during the course of the treatment of five patients treated with trimodality approach (surgery + chemo + radiationtherapy). CT scans were registered with automatic rigid registration on bony anatomy. Structures’ contours were copied on the verification CTs and manually adjusted by a radiation oncologist. Changes in the volume of air pockets within the CTV over the treatment course were quantified.

For each patient, a 2-fields IMPT plan was generated on the planning CT and then recalculated on the verification CTs.

### Purpose/Approach:

1. To evaluate the dosimetric impact of anatomy changes in patients affected by malignant pleural mesothelioma (MPM) on IMPT plans and 2) to propose an approach to mitigate this effect.

### Materials and Methods:

The study was based on the planning CT and either 3 or 4 verification CT scans acquired during the course of the treatment of five patients treated with trimodality approach (surgery + chemo + radiationtherapy). CT scans were registered with automatic rigid registration on bony anatomy. Structures’ contours were copied on the verification CTs and manually adjusted by a radiation oncologist. Changes in the volume of air pockets within the CTV over the treatment course were quantified.

For each patient, a 2-fields IMPT plan was generated on the planning CT and then recalculated on the verification CTs.

### Results:

The CT data showed a systematic reduction of the air volume in the CTV over the treatment course: the mean reduction between planning CT and last control CT was 80±13% (range: 63-100%). The dosimetric impact on the planned dose distributions is summarized in table. A decrease of V98 in the CTV up to 17.2% was observed, along with an absolute +24% in V107. Dramatic discrepancies were not observed for OARs: the typical increase in mean dose for liver and ipsilateral kidney was 2Gy and 3Gy, respectively. However, relative differences up to 40% were found in V40 for esophagus. The IMPT plan provided similar results as IMRT concerning target coverage, while for OARs it is more robust. However, even after the last recalculations, IMPT is still better. When IMPT treatments were recalculated on the first verification CT and then recalculated on the remaining verification CTs, smaller differences were found (see figure), especially concerning the target coverage (on average V98 decreased only by 4.7%).

For both the liver and ipsilateral kidney the mean dose increase was less than 1 Gy. A 4D-CT scan was acquired for one patients to assess intrafraction organ motion. Results showed no impact.