

## Incident description

A patient is referred to the radiotherapy department for irradiation of the base of the tongue. The patient receives a total of 35 fractions of 2 Gy with two arcs (VMAT).

The patient is irradiated with a closed mask and matching is done by daily CBCT-imaging. As the mask is closed, SGRT-technology is not used for patient set-up. The patient is positioned as close as possible to the isocentre using the projected laser lines and a CBCT is taken to perform the shift towards the isocentre. If the shift exceeds 1 cm, a second CBCT is made before irradiation. After the first fraction, the table parameters are saved in the R&V system to reduce the likelihood of a large shift during subsequent fractions.

On the day of the second fraction, the patient is repositioned based on the projected laser lines, because the table parameters were not captured on the day of the first fraction. The RTT at the treatment console saves this position of the table in the R&V system, which is not compliant with the standard procedure, and then wants to take a CBCT to check the position, but fails to notice that the irradiation field is selected instead of the CBCT. As a result, irradiation starts at a position that was not verified with CBCT-imaging. After 163 MU of the first arc, the RTT notices the error, pushes the stop button and notifies the event to the attending physician.

The physician decides to take a CBCT to determine where exactly the dose has been administered. After consultation between the doctor and the medical physicist, the patient is repositioned according to the procedure and irradiated with the second arc at the correct isocentre.

The dose calculation of the erroneous irradiation showed that the event did not affect the patient and the treatment plan did not need to be corrected.

## Root cause analysis

The following root causes have been identified:

### **Human factors:**

- The patient positioning procedure was not followed both during the first and second fraction.
- The RTT at the treatment console did not understand the procedure properly.
- There was lack of focus at the treatment console.

### **Technical factors:**

- For this particular patient, the position of the gantry of the first arc was similar to the starting position of a CBCT.
- Large shifts are possible after patient positioning based on projected laser lines and CBCT matching.

## Corrective actions:

- The procedure for the correct positioning of patients with a closed mask was explained during a meeting of the department. The importance of following each and every step was highlighted.
- The requirement of extra vigilance and focus at the treatment console was stressed.
- The use of SGRT-technology with closed masks will be investigated to reduce the likelihood of major shifts.