REX 6 - YEAR 2023

Incident description

A patient with several metastases in the vertebral column is to be irradiated at 3 localisations with 3 treatment plans. The patient was irradiated in the past on the thoracic wall and subclavian area, for which a reconstruction was made. Based on this reconstruction, it was decided to reduce the dose at the level of T2: 4 x 4 Gy instead of the standard dose prescription of 4 x 4,5 Gy.

According to the procedure, kV-imaging is to be taken for each localisation. To facilitate the matching of the images, auxiliary structures are contoured beforehand by the attending radiation oncologist. Which structures are contoured is not laid down in a protocol but is decided by the attending physician.

For this patient, only vertebrae were contoured, as the physician felt that additional structures such as the clavicle and sternum are too mobile and can therefore lead to confusion.

According to standard procedure, no doctor is present at the start of treatment. However, if there are problems, the RTTs can always call a doctor to the treatment unit.

For the first fraction, 3 RTTs were present at the treatment unit. As the patient had a lot of pain, the RTTs did not want to leave her on the table longer than necessary, especially because of the 3 plans. The matching of the images for plan 'T2' was difficult, but the RTTs did the matching together and were confident, so no doctor was called and the patient was irradiated.

In the evening, the online matchings of all patients are reviewed offline by a doctor, who noticed then that the matching for plan 'T2' was incorrect: a vertebra had been mismatched and thus wrongly irradiated.

The attending physician does not expect any clinical impact. Reconstruction of the delivered dose showed that the radiation dose on the spinal cord remained below the predetermined constraints. Given the small field, a part of the PTV was underdosed. It was considered whether this part could receive an additional fraction, but because of the small field and previous irradiation, it was decided not to do so.

Root cause analysis

The following root causes have been identified:

Human factor: Monitoring
The height of the vertebrae are poorly visible on kV-images.

Human factor: Verification
- There were no auxiliary structures contoured because of their motility.
- The RTTs were sure of the matching and did not call a physician.

Organisational factor: Culture
There is standard no doctor present at the start of the treatment.

Patient related factors
The patient had a lot of pain and 3 localisations to treat. The RTTs wanted to keep the time on the treatment table as short as possible.

Corrective actions:

- The following fraction, the attending physician was present at the treatment machine to do the matching online.
- Additional structures were contoured to better estimate the height of the vertebrae during the next fractions.
- There will be an annual (internal) refresher course on 'matching' for all RTTs.