New radiotherapy approach reduces symptoms of dry mouth in patients with head and neck cancers

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Researchers have shown for the first time that it is possible to reduce the distressing symptoms of dry mouth in patients treated with radiotherapy for head and neck cancers if the radiation dose to a salivary gland (called the submandibular gland) on the opposite side to the tumour is kept to the minimum.

The largest study yet to show a correlation between radiation doses to the submandibular glands and their output of saliva was presented today (Saturday) at the 2nd Forum of the European Society for Radiotherapy and Oncology (ESTRO). As a result of the findings, the researchers from The Netherlands say that guidelines for the recommended maximum dose can be issued for use in clinical practice to benefit patients.

The submandibular glands are two salivary glands beneath the lower jaw, one on the left and one on the right. These are mainly responsible for producing saliva while we are at rest and during the night. The parotid glands are another pair of glands that produce saliva when we are eating. Patients with tumours in the areas of the mouth and throat are usually treated with radiotherapy, but the treatment can adversely affect the functioning of the salivary glands, leading to xerostomia – or dry mouth. Around 40% of patients treated for head and neck cancers suffer from xerostomia in the long term, which causes problems with eating, sleeping, speech, tooth loss and oral hygiene, leading to diminished

quality of life, social isolation and difficulty in continuing work. Attempts to treat xerostomia and its consequences can cost hundreds or even thousands of Euros per patient per year and are not very effective. The key, therefore, is prevention.

Associate professor, Dr Chris Terhaard, a radiation oncologist at the University Medical Center Utrecht in The Netherlands, set out to see whether it would be possible to deliver Intensity Modulated Radiotherapy (IMRT) to tumours with the intention of sparing the submandibular gland on the opposite side of the tumour (the "contralateral" gland) and both parotid glands. He also wanted to see what the maximum radiation dose should be, and what the effect of this method of treatment would have on the prevalence of xerostomia in patients six weeks and one year after treatment.

Dr Terhaard said: "Since the submandibular glands are the main source of saliva in resting conditions, the dose to these glands might have serious implications for the feeling of a dry mouth. So, it is important to look for better radiation techniques to spare at least one of the two submandibular glands. Sparing the submandibular glands is, however very difficult. In general, the submandibular gland situated near to the tumour of the throat cannot be spared. So, in this study we tried to spare the submandibular gland on the opposite side. We looked for the correlation between the radiation dose received by this gland and the decrease of the production of saliva."

Dr Terhaard and his colleagues recruited 50 patients with throat cancers, in which cancer cells had not migrated into the contralateral lymph nodes, and which had not metastasised (spread) to other parts of the body. They were treated with the contralateral submandibular gland-sparing IMRT. This meant that the contralateral glands received much lower radiation doses than they would do with standard radiotherapy for the condition. These patients were compared with a historical group of

52 patients who had received radiotherapy that had spared only the parotid glands.

After six weeks and after one year, the researchers measured saliva flow objectively from the submandibular and parotid glands by stimulating saliva with citric acid on the tongue and catching the resulting saliva in specially designed cups. They also used a questionnaire to measure the patients' subjective experience of dry mouth.

"We found that saliva flows from the contralateral submandibular glands were significantly higher at six weeks and at one year in patients who received a dose to the submandibular gland of less than 40 Gy, and this translated into fewer complaints of dry mouth. Using the new technique, we managed to keep the dose under 40 Gy in 50 percent of the patients," said Dr Terhaard. "Now we are looking for further improvements, since in 50 percent of the patients the dose to the submandibular glands was still too high."

The researchers found that all but one of the patients who could be treated with radiation doses of less than 40 Gy to the submandibular gland were the patients who had small tumours (less than 4cms in diameter). These patients consequently had fewer problems with xerostomia after a year.

"If the tumour is more advanced – larger than 4cms or with the contralateral lymph nodes involved – the distance from the tumour to the contralateral submandibular gland may become too small to spare this gland," said Dr Terhaard.

"This is the largest detailed study to show the correlation between the dose to the submandibular gland and the measured output of the contralateral submandibular gland. It is the first study to show subjectively and objectively that when you reduce the dose to the

submandibular gland, the patients have fewer severe complaints. This leads to a guideline, which can be used in clinical practice, of the recommended maximum dose of 40 Gy for the submandibular gland. It also shows that with improved techniques, such as IMRT, you may better spare the submandibular gland, as well the parotid glands," he concluded.

President of ESTRO, Professor Vincenzo Valentini, a radiation oncologist at the Policlinico Universitario A. Gemelli, Rome, Italy, commented: "The translation of a dosimetry benefit into a clinical benefit is of definitive relevance in the era of highly sophisticated radiotherapy. There is a new generation of studies becoming available that aims to confirm the impact of the new technology on tumour control and quality of life. This is one of these studies and not only confirms the benefits for the patients but also provides new insights to ameliorate the already good advantages for the patients."

Provided by European Society for Radiotherapy and Oncology

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