CASE REPORT

A LOWER GINGIVA CANCER PATIENT WHO RECOVERED FROM LOSS OF TASTE ACUITY AFTER HEALING OF MANDIBULAR OSTEORADIONECROSIS

Tsutomu Saito*1, Toru Furusaka*2, Jiro Kawamori*1, Michiko Hirayama*1, Shoko Fukushima*1, Yoshiaki Tanaka*1, Akinori Kida*2

(Received 15 May 1999, accepted 13 July 1999)

Abstract: We report a patient who suffered from prolonged loss of taste acuity after irradiation and recovered lately.

An electric gustometry was used for the evaluation of quantitative local taste acuity and a modified LENT SOMA scale was used for the evaluation of subjective total taste acuity.

A sixty three years old male patient having lower gingiva cancer suffered from loss of taste acuity with a duration of more than 4 and a half years after radiation therapy to the oral cavity. And he recovered from the loss of taste acuity after the healing of mandibular bone sequestration due to osteoradionecrosis.

This indicates that intra-oral diseases can delay recovery from loss of taste acuity after oral cavity irradiation.

Key words: Loss of taste acuity, Gustometry, Late radiation complication, Oral cavity irradiation

INTRODUCTION

Normal tissue radiation damage is one of the major dose limiting factors in radiation therapy. According to the increase of long life expectancy of cancer patients, late complications have become one of the most important dose limiting factors. Radiation myelopathy causes one of the most serious deterioration to QOL of patients. Recently, the late complications were studied basically and clinically and much information has been available3).

Loss of taste acuity is one of the normal tissue complications accompanying radiation therapy of head and neck cancer when the oral cavity is included in its irradiated volume. The loss of taste acuity starts a few weeks after the beginning of the treatment, and almost all patients lose their taste acuity. This early effect has been precisely studied1)-7).

After radiation therapy, taste acuity becomes well and recovers to its previous level after 6 months or more in many patients1), but some patients show incomplete recovery or no recovery. This mechanism has not clearly been understood. A report implies the radiation dose-effect to this damage, but it does not demonstrate the relationship between them2).

We have studied the relationship between subjective acuity loss and quantitative acuity loss of taste of patients who received oral cavity irradiation. Here we report a suggestive case.

METHODS

An electric gustometer (TR-06, Rion Corp.,...
Japan) was used for evaluation of quantitative local taste acuity (QLTA). An electric taste threshold (ETT, outputs are -6 to 34 dB, corresponding currents are 4 to 400 µ A) measured with the gustometer shows local taste acuity, and a lower ETT shows higher taste acuity.

ETTs were measured at points of right and left sides of tongue apexes, vallate papillae and soft palates in the morning at two or more hours after breakfast. The normal ETT limits of tongue apexes, vallate papillae and soft palates are ≤8, ≤14, ≤22, respectively, and the variation of ETTs between right and left sides is ≤4º.

A modified LENT SOMA scale used for evaluation of subjective total taste acuity (STTA) is shown in Table 1.

### CASE PRESENTATION

A sixty three years old man at the first treatment had T2NOM0 squamous cell carcinoma in his anterior lower gingiva. He also had DM, chronic hepatitis, gall stones and hypertension, and he had a smoking habit. He received colectomy due to colon cancer two months after this gingiva cancer treatment.

He received 39.6 Gy of external beam cobalt 60 teletherapy with a daily dose of 1.8 Gy, and also received 30 Gy of intra-oral electron (12 MeV) beam cone therapy with a daily dose of 2.0 Gy concomitantly to the primary tumor from October 1993 to December 1993. He received 100 mg/body of CBDCA iv chemotherapy twice weekly for 6 weeks. The tumor showed a complete response, and the tumor has not recurred for more than 5 years.

During the treatment, STTA changed from grade 0 to grade 4, and its recovery was slow. His STTA was still grade 1 at two and a half years after the treatment, and on that time he received extractions of his teeth due to tooth caries. Two months after the extractions, his mandibular showed bone exposure, and he suffered from sequestration of the mandibular bone for a duration of more than 1 year after that. The STTA was grade 1 and the ETTs were 12 to >34 just after the fall of the sequesta (Fig. 1a). Five months after the fall, the STTA became grade 0 and the ETTs of right and left sides of vallate papillae were 0 and 12, respectively, and the ETTs of the right and left sides of the tongue apexes showed 12 and 10, respectively (Fig. 1b).

His loss of taste acuity remained for more than 4 and a half years, and it became normal after the sequestration healing. This implies that intra-oral inflammation is one of the factors for loss of taste acuity, and that healing of the inflammation is one of the important factors in the recovery from loss of taste acuity.

### DISCUSSION

There are some gustometric techniques for measurement of objective taste acuity. A full mouth method is used for measurement of total taste acuity, and the electric gustometry and a paper disc method are used for measurement of local taste acuity. Comparing to the paper disc method, advantages of electric gustometry are high quantitativeness, short measurement time and high repetitiotiobility and a disadvantage is no qualitative, such as sweet and bitter taste.

The etiologies of taste disorder are classified into central nerve system disorders, peripheral nerve disorders, oral diseases, systemic disorders (drug induced, vitamin deficiency, zinc deficiency, DM, endocrine disorder) and psychological disorders). Patients who received gastrointestinal tract surgery sometimes complaint taste alteration. Effect of aging is not remarkable and taste acuity is usually kept in the elderly.

Radiation therapy causes severe or complete loss of taste acuity in most patients who received irradiation to the oral cavity. The damage is usually transient but sometimes permanent after
the treatment.

Sato and Kamata\textsuperscript{3} analyzed acute loss of taste acuity during radiation treatment with the electric gustometry. They have reported that loss of ETTs started at 10 Gy/5 days and ETTs overshot at 40 Gy/26 days due to severe loss of acuity and stomatitis. Conger\textsuperscript{4} has stated that a dose of 240 rad reduced the taste of bitter by one half and 400 rad reduced the taste of acid by the same amount. Conger and Wells\textsuperscript{5} have studied the radiation-induced destruction of taste buds in mice following irradiation. The buds began to disappear 4 days after 100 rad, the number of them fell to a minimum at 9 days and they showed recovery after 10 days.

Acute taste complications have been well investigated and are always encountered in daily clinical practices. But the late taste complications are not well investigated due to difficulty of analysis and assessment, although they are sometimes encountered in daily clinical practices.

The taste cells are capable of repopulating within 4 months after treatment of radiation therapy in most cases\textsuperscript{6}, although some degree of permanent impairment may remain. The recovery of taste acuity starts several months after the treatment and the loss recovers by one year in most cases. But some cases show partial or no recovery even at several years later, and factors which influence to the delay of the recovery are not well known.

Murakami \textit{et al}\textsuperscript{7} have implicated the longer recovery delay of taste acuity in higher dose irradiated cases, but they have not indicated the relationship between taste acuity and local dose. Xerostomia, stomatitis, age, a smoking habit, and chemotherapy may also be possible factors of loss of taste acuity. But some reports\textsuperscript{5,7} have shown no relationship between xerostomia and loss of taste acuity, although xerostomia is strongly affected by dose and irradiated volume.

In the present case, the recovery from loss of taste acuity was delayed during osteonecrosis and healing of sequestration induced the recovery. This indicates that stomatitis due to osteoradionecrosis was the strongest factor of recovery delay from the loss of taste acuity in the present case.

The present case implies that radiation damage to the oral cavity is strongly implicated in the loss of taste acuity, although the loss is usually recovered. The present case also implies that a

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure1.png}
\caption{Pictures of a patient just after the fall of the sequesta (a) and re-epithelization 5 months after the fall (b). ETTs at the points of soft palate, vallate papillae and apex of tongue, respectively, STTA and xerostomia LENT SOMA score are also shown.}
\end{figure}
certain factor, such as stomatitis or unknown factors, induces loss of taste acuity when combined with radiation damage, although the loss does not remain with the factor alone. There may be a cooperative relationship between radiation damage and a certain factor to the loss of taste acuity.

The radiation damage to normal tissues is classified into two types, acute complications and late complications. Damage, such as loss of taste acuity, which appears during the treatment period as acute complications and is recovered from months to years later as late complications is not defined in this classification. This damage is better termed as a chronic complication. Xerostomia and skin pigmentation are also classified in this category.

REFERENCES