



Saliva changes 1-year after intensity-modulated and conventional radiotherapy for nasopharyngeal carcinoma.

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INTRODUCTION

Nasopharyngeal carcinoma (NPC) is very common among Southern Chinese people. The primary treatment of NPC is by radiotherapy because the tumour is highly radiosensitive. Salivary hypofunction is the chief oral complication following treatment and causes discomfort and an increased risk of oral diseases.^{1,2} Intensity-modulated radiotherapy is a novel technique which can spare the salivary glands from radiation damage.³ To our knowledge, no data are presently available comparing saliva changes in NPC patients after conventional and intensity-modulated radiotherapy.

OBJECTIVE

To compare quantitative and qualitative changes in saliva of nasopharyngeal carcinoma (NPC) patients receiving conventional radiotherapy (CT) and intensity-modulated radiotherapy (IMRT).

MATERIALS AND METHODS

Subjects

- Double-blind, randomized design
- 29 consecutive patients newly diagnosed with NPC (T2) recruited from the Queen Mary Hospital, Hong Kong were randomized to either CT or IMRT limbs (Fig. 1-2)
- Patients who had history of chemotherapy or radiotherapy in head and neck region were excluded

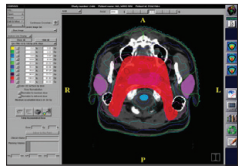


Fig.1

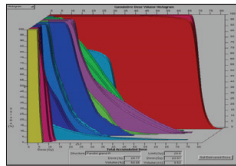


Fig.2

Saliva collection and analysis

- Stimulated whole saliva (SWS): chewing of a rubber ring for 5min
- Stimulated parotid saliva (SPS): chewing of a rubber ring and application of 0.1ml 2% citric acid at 3min intervals for 15min, collected using a Lashley cup secured over a parotid duct
- Saliva volume, pH and buffer capacity were measured
- Evaluation points: prior to and 2-, 6- and 12-months after treatment performed by single examiner (EHNW)

Data analysis

- Paired sample T, Wilcoxon signed ranks tests to compare changes over time
- Independent sample T, Mann-Whitney, Chi-square tests to compare differences between groups. 5% level of significance was used

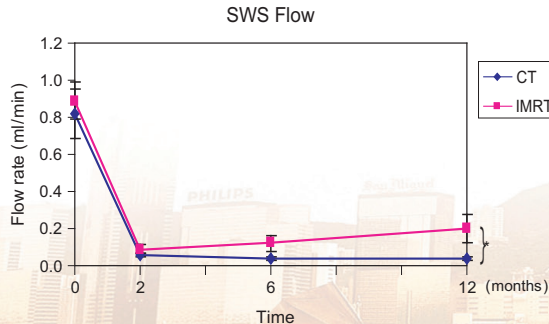
RESULTS

- A total of 28 out of 29 patients completed the study. One subject withdrew and sought treatment in a private hospital

Baseline data before treatment

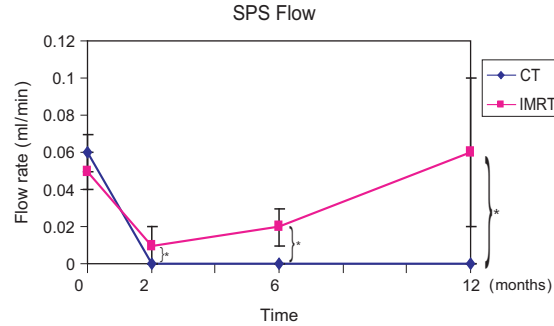
	CT	IMRT
Number	18	11
Age (mean, SD)	51(9)	43(9)
Gender (M, F%)	77, 23	82, 18
RT dose (mean, SD cGy)	7565(437)	7200(606)
SWS (mean, SD ml/min)	0.82(0.54)	0.89(0.34)
SPS (mean, SD ml/min)	0.06(0.06)	0.05(0.05)
pH of SWS	7.2(0.3)	7.2(0.3)
pH of SPS	6.2(0.9)	6.1(0.7)
Buffer capacity of SWS (high, medium, low %)	83, 6, 11	82, 18, 0
Buffer capacity of SPS (high, medium, low %)	11, 6, 83	9, 9, 82

No significant differences for all variables tested



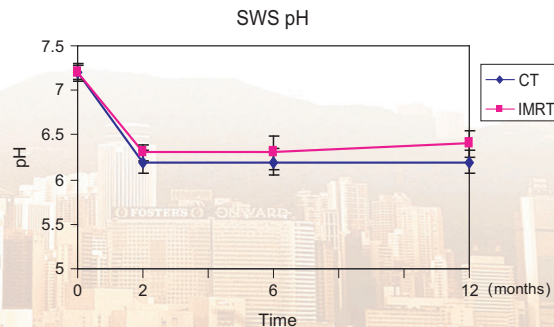
SWS flow (Fig. 3)

- Significant reduction in SWS was found in both groups between baseline and the 2-month evaluation point ($p < 0.01$).
- Gradual recovery of SWS was observed in the IMRT group over the study period.
- No improvement was observed in the CT group.
- Significant difference in flow was found between groups at 12-months ($p < 0.01$), with greater flow in the IMRT group.



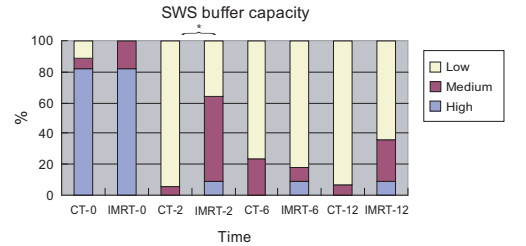
SPS flow (Fig. 4)

- Significant reduction in SPS was found in both groups between baseline and the 2-month evaluation point ($p < 0.01$).
- Gradual recovery of SPS was observed in the IMRT group over the study period. No improvement was observed in the CT group
- Significant difference in flow was found between groups at 2-month ($p < 0.05$), 6-month ($p < 0.01$) and 12-month point ($p < 0.01$), with greater flow in the IMRT group. No difference in flow was found between 12-month point and the baseline in IMRT group ($p > 0.05$).



pH of SWS (Fig. 5)

- Significant drop in pH was found in both groups between baseline and the 2-month evaluation point ($p < 0.01$) and no change was observed afterwards.
- There was no difference in pH between groups.



Buffer capacity of SWS (Fig. 6)

- The buffer capacity was compromised in both groups between baseline and the 2-month evaluation point ($p < 0.01$). A significant difference was found between groups at the 2-month but not at the 6- and 12-month evaluation points.

DISCUSSION

- Both treatments resulted in significant impairment of saliva quantity and quality.
- There was less reduction in SWS flow in the IMRT group.
- The IMRT group demonstrated complete recovery in SPS flow while the CT group did not.
- No difference in pH changes between two groups.
- The impairment in SWS buffer capacity was less in the IMRT group at 2-month, however, both groups were more or less the same at the 6- and 12-month evaluation.
- The observed differences in salivary parameters between the two treatment groups were most probably due to differences in radiation dose imposed on the parotid glands.

CONCLUSION

Intensity-modulated radiotherapy for nasopharyngeal carcinoma can minimize both quantitative and qualitative impairment of salivary gland function and allow full recovery of parotid salivary flow 1-year after treatment.

REFERENCES

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