

Use of Positioning Stents in Lingual Carcinoma Patients Subjected to Radiotherapy

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To evaluate the short-term efficacy of oral positioning stents in minimizing the adverse oral effects of external beam radiation therapy in patients suffering from lingual carcinoma, 48 subjects were selected for this study. Half of the patients (n = 24) were given positioning stents while the other half (n = 24) formed the control group. Subjects were evaluated for oral radiation toxicity effects using the Radiation Therapy Oncology Group's 045 head and neck cancer adverse events grading tool from the National Cancer Institute's Common Toxicity Criteria for Adverse Events over a period of 60 days. The control group showed a significant increase in palatal mucositis, xerostomia, and salivary changes compared to the study group. *Int J Prosthodont* 2010;23:450–452.

Though radiotherapy is a well-established method for treating carcinomas arising from the base of the tongue, it has many adverse effects on the oral cavity, such as progressive caries, loss of taste sensation, dry mouth, painful ulcerations, osteomyelitis, and trismus. Management of these effects may require treatment

interruption, thereby reducing the effectiveness of therapy. The aim of this study was to evaluate the efficacy of positioning stents in minimizing the potential harmful effects of external beam radiation on oral tissues.

Materials and Methods

Forty-eight patients undergoing radiotherapy for the treatment of tongue cancer who satisfied the inclusion criteria of adequate mouth opening, a stage III lesion occurring on the base of the posterior third of the tongue, no local extension of the tongue lesion, and no infection or other disease were selected for the study after ethics committee approval and obtaining informed consent.¹

The study sample was divided randomly into a study group (n = 24), to whom positioning stents were given during radiotherapy, and a control group (n = 24). The stent was fabricated using an interocclusal record at half of the maximum mouth opening of the patient. A wax extension was fabricated over the tongue area by merging two sheets of base plate wax (approximately 3 mm) and attached to the interocclusal record to

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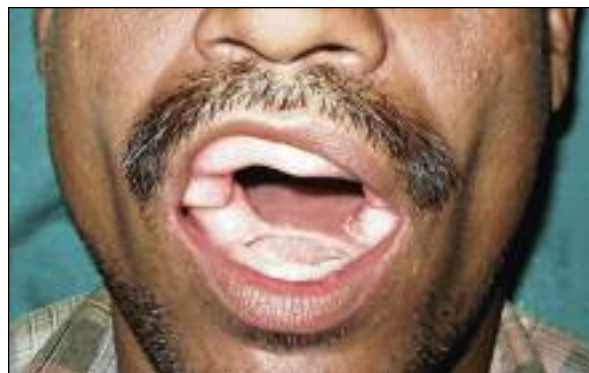
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Fig 1 Intraoral view of the positioning stent.**Table 1** Assessment at 30 Days

Adverse effects	Control group (n = 24)		Study group (n = 24)		Statistical significance	
	Mean RTOG score	SD	Mean RTOG score	SD	Z score	P
Mucositis (palate)	0.917	0.289	0.000	0.000	4.412	< .001
Salivary changes	1.417	0.515	1.167	0.389	1.319	.319
Dry mouth (xerostomia)	2.083	0.515	1.250	0.452	3.285	.002
Taste alteration	1.833	0.389	1.750	0.452	0.492	.755
Dysphagia	1.750	0.452	1.417	0.515	1.621	.178
Trismus	0.250	0.452	0.083	0.289	1.072	.514
Caries	0.000	0.000	0.000	0.000	–	–
Pain on swallowing	1.500	0.522	1.250	0.754	0.771	.514

RTOG = Radiation Therapy Oncology Group; SD = standard deviation.

depress the tongue inferiorly while maintaining an open bite. A slit was created in the anterior region for consistent orientation of the tongue. The appliance was polymerized in autopolymerizing acrylic resin (Rapid Repair, Dentsply), finished, polished, and inserted with the necessary instructions and adjustments (Fig 1).

All subjects were given conventional external radiotherapy (Theratron 780 E, MDS Nordion) in two phases over 7 weeks. The first phase (46 gray doses in 23 fractions, 5 fractions/week) targeted the primary lesion and the entire neck by a parallel opposite field technique; the second phase consisted of 24 gray doses in 12 fractions. Radiation side effects were graded as per the Radiation Therapy Oncology Group's 045 head and neck cancer adverse events grading tool from the National Cancer Institute's Common Toxicity Criteria for Adverse Events at intervals of 30, 45, and 60 days from the onset of radiotherapy by three investigators to eliminate bias.² If their opinion was not unanimous, the majority was considered as final. The Mann-Whitney *U* test and the Wilcoxon rank sum test were used for statistical analysis, with a *P* value of less than .05 indicating statistical significance.

Results

The assessment at 30 days revealed no dental caries in either group (Table 1). Significantly higher scores in the control group were seen for mucositis and dry mouth, and nonsignificantly higher scores were seen for salivary changes, taste alteration, dysphagia, trismus, and pain on swallowing. The assessment at 45 days revealed similar findings (Table 2). The findings at 60 days were similar to those at 30 and 45 days, except that the mean scores for taste alteration in both groups were the same (Table 3).

Discussion

The significantly lower occurrence of mucositis of the palate and its delayed onset in the study group could be due to sparing of the maxilla from the radiation field with the positioning stent.³ The significantly lower occurrence of xerostomia and less increase in salivary consistency in the study group probably resulted from the exclusion of the parotid from the radiation field by depressing the mandible.

Table 2 Assessment at 45 Days

Adverse effects	Control group (n = 24)		Study group (n = 24)		Statistical significance	
	Mean RTOG score	SD	Mean RTOG score	SD	Z score	P
Mucositis (palate)	1.917	0.289	0.250	0.452	4.421	< .001
Salivary changes	1.667	0.492	1.333	0.492	1.599	.178
Dry mouth (xerostomia)	2.167	0.389	1.417	0.515	3.172	.006
Taste alteration	2.000	0.000	1.750	0.452	1.813	.319
Dysphagia	2.000	0.000	1.667	0.492	2.145	.178
Trismus	0.250	0.452	0.083	0.289	1.072	.514
Caries	0.000	0.000	0.000	0.000	–	–
Pain on swallowing	1.667	0.492	1.250	0.754	1.430	.219

RTOG = Radiation Therapy Oncology Group; SD = standard deviation.

Table 3 Assessment at 60 Days

Adverse effects	Control group (n = 24)		Study group (n = 24)		Statistical significance	
	Mean RTOG score	SD	Mean RTOG score	SD	Z score	P
Mucositis (palate)	2.583	0.515	0.583	0.793	4.022	< .001
Salivary changes	1.833	0.389	1.333	0.492	2.432	.039
Dry mouth (xerostomia)	2.167	0.389	1.417	0.515	3.172	.006
Taste alteration	2.000	0.000	2.000	0.000	0.000	> .999
Dysphagia	2.000	0.000	1.750	0.622	1.470	.319
Trismus	0.583	0.793	0.000	0.000	2.444	.089
Caries	0.000	0.000	0.000	0.000	–	–
Pain on swallowing	1.833	0.389	1.667	0.492	0.923	.514

RTOG = Radiation Therapy Oncology Group; SD = standard deviation.

No significant differences between the groups were recorded for dysphagia, taste alterations, and incidence of dental caries, possibly because of the short duration of the study. Trismus incidence was observed in both groups, most likely due to the stent being unable to spare the elevator and depressor muscles from irradiation.⁴ The nonsignificant increase in pain on swallowing in the control group and its earlier onset could be a result of greater mucositis.⁵

Conclusion

Positioning stents were effective in reducing the incidence and severity of mucositis and xerostomia and improving the quality of life and prognosis of the subjects, though they were inconclusive with regard to other adverse effects because of the short duration of the study. The lack of a power analysis and the small sample size were other limitations of this study. Longer studies with a large patient cohort should substantiate the routine use of positioning stents in managing patients who suffer from lingual carcinoma by conventional parallel opposite field radiotherapy. It is also prudent to mention that the results of this study would not

apply to alternative radiation techniques, such as conformal radiation therapy, intensity-modulated radiation therapy, image-guided radiotherapy, and internal radiation.

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