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Original Article

Prospective observational comparative study of radiotherapy induced toxicities (xerostomia, skin reaction, and mucositis) between three–dimensional conformal radiotherapy and intensity modulated radiotherapy technique to oral cavity cancer of head and neck

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Abstract

Background: Oral cavity cancers often require radiotherapy (RT), leading to toxicities such as xerostomia, skin reactions, and mucositis. This study aims to compare these toxicities between three–dimensional conformal radiotherapy (3D–CRT) and intensity–modulated radiotherapy (IMRT) techniques.

Methods: This prospective observational study included 60 patients with primary oral cavity squamous cell carcinoma. Patients were divided into two groups: 30 underwent 3D–CRT, and 30 underwent IMRT. Toxicities were assessed weekly during RT and bi–monthly up to one year post–RT using Radiotherapy Oncology Group (RTOG) criteria.

Results: The mean age was 46.60 ± 11.58 years for 3D–CRT and 48.0 ± 11.38 years for IMRT patients. Both groups had a majority of male patients. No significant difference was observed in mucositis and skin reactions. However, xerostomia was significantly higher in the 3D–CRT group from 6 to 10 months post–RT.

Conclusions: IMRT is preferable for treating oral cavity cancer to reduce long–term xerostomia compared to 3D–CRT, despite similar rates of acute mucositis and skin reactions.

Keywords: Radiotherapy; Oral cavity cancer; Xerostomia; Skin reaction; Mucositis; Three–dimensional conformal radiotherapy (3D–CRT); Intensity–modulated radiotherapy (IMRT)

Background

Head and neck squamous cell carcinomas (HNSCC) are the 6th commonest cancer in the world(1). It is the third most prevalent cancer in India. According to GLOBOCON 2020 data, in India, the overall incidence of cancer is 225419 annually, with an overall mortality of 125244, including carcinoma of the lips and oral cavity, nasopharynx, oropharynx, hypopharynx, and larynx(2). Among the head and neck cancers, carcinoma of the oral cavity predominates in our population. It is due to the high

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prevalence of tobacco chewing, bidi smoking, and alcohol consumption. Most of the cancers (70–80%) of the oral cavity are diagnosed with locally advanced disease[3].

Oral cavity cancers are mostly treated through surgery, and/or RT and chemotherapy. Most of them require radiotherapy either as definitive or post–operative treatment, concurrently with chemotherapy or targeted agents[4–11]. Dose delivered in post–operative settings is 60–66 Gy with or without chemotherapy, and in definitive settings is 66–70 Gy[4–8]. At these radiotherapy doses, despite producing higher local control, an increase in radiation dose is associated with higher chances of radiation–induced toxicity[6,7,9,12].

Advancement in imaging techniques, improved identification of target volume, three–dimensional image reconstruction, computer optimized algorithms have led to evolution of radiation delivery from Two–Dimensional Radiotherapy to Three–Dimensional Conformal Radiotherapy (3D–CRT) which now has a geometrically modulated beam shape that makes it possible to conform very closely to the target volume, while minimizing the dose to normal surroundings structures or tissue. Three–dimensional conformal radiotherapy (3D–CRT) still leads to significant volumes of normal tissue being irradiated with high radiation doses because it is delivered in approximately three fields with a uniform dose in each field. To compensate for the imperfections of 3D–CRT, dynamic multileaf collimators (MLC) were designed so the beams could have a different shape when coming from different angles.

Further progress in conformal radiotherapy led to the evolution of Intensity Modulated Radiation Therapy (IMRT) that can modulate the radiation beam geometrically as well as in its fluence simultaneously to allow delivery of non–uniform fluence in a way that the composite dose distribution is optimized from any given position. Thus, IMRT improves the therapeutic ratio by allowing a much higher possibility to sculpt radiation. But there is a risk of geographical miss of the tumor with the IMRT technique, as there is a rapid fall off of the dose outside the PTV region.

Oral cavity cancer is one of the ideal sites for IMRT as the target area is geometrically complex and surrounded by many critical normal tissues and organs at risk, such as salivary glands, optic apparatus, inner ear, and brainstem are within a few millimeters of the high dose radiotherapy volumes. The most common presentations of acute and late toxicity are mucositis, dermatitis, odynophagia, xerostomia, speech and swallowing difficulty, and aspiration, and may also contribute to mandibular osteoradionecrosis[13].

A retrospective study conducted in a specialized cancer center in central India compared the toxicity profile of 3DCRT with IMRT in head and neck cancers. They found no statistically significant difference in the rate and severity of acute radiation toxicity between the 3D–CRT and IMRT groups, such as dermatitis and mucositis. On the contrary, a significantly higher number of patients in the 3D–CRT group developed late toxicities, such as dysphagia and xerostomia, as compared to patients treated with the IMRT technique[5].

This study aims to prospectively evaluate and compare the acute and late toxicities between three–dimensional conformal radiotherapy (3D–CRT) and intensity–modulated radiotherapy (IMRT) techniques in a specific subgroup of head and neck patients, ie, Oral Cavity cancers, either in post–operative settings or definitive settings. The evaluation was done both during and after the completion of radiotherapy treatment.

Methods

AIM– This study aims to prospectively evaluate and compare the acute and late toxicities between three–dimensional conformal radiotherapy (3D–CRT) and intensity–modulated radiotherapy (IMRT) techniques in Oral cavity cancers.

Study design—This is a prospective, randomized, observational study that recruited sixty patients with biopsy–proven oral cavity squamous cell carcinoma. Thirty patients were randomized into the 3D–CRT group, while thirty patients were randomized into the IMRT group for oral cavity squamous cell cancer in Gandhi Medical College, Department of Radiotherapy, in collaboration with Jawaharlal Nehru Cancer Hospital and Research Centre, Bhopal. The study was conducted between January 2018 and March 2019.

Eligible patients included all histologically proven operated cases of squamous cell carcinoma of the oral cavity; any high risk feature, such as those defined in EORTC 22931, which include stage III or IV, extra nodal spread, microscopic surgical margins positive, vascular embolus, and peri–neural invasion; aged 18–75 years; Karnofsky performance score (KPS) more than 70; AJCC 8th edition stage I–IVb with normal cardiac; pulmonary and renal function tests. Early–stage diseases were only included if they satisfied any one of the high–risk features of EORTC 22931.

Exclusion criteria comprised patient age less than 18 years and more than 75 years old, advanced metastatic stage IVc, KPS score less than 70, inoperable disease at presentation, and histological variant other than SCC of oral cavity cancer.

All the patients were treated with conventional fractionation and sequential boost using the Linear Accelerator C–Linac 2300C. In the 3D–CRT and IMRT group patients, the radiotherapy dose was 66 Gy in 33 fractions (2 Gy per fraction) with weekly concurrent chemotherapy for post–operative patients, as per the EORTC 22931 trial. All patients were taken up for planning Contrast contrast–enhanced computed tomography (CECT) scan from the vertex to carina, 2.5 mm slice thickness. The planning images were transferred to the Monaco treatment planning system (TPS), where further segmentation and image fusion were done.

Gross tumor volume (GTV) was defined by electronic image fusion of pre–operative cross–sectional imaging, clinical examination done during initial evaluation before the surgery at presentation. Clinical target volume (CTV) was defined as 1 cm margin around the GTV, along with nodal stations at risk. Planning Target Volume was an isotropic margin of 0.5cm to the CTV. 3 different volumes were defined as per the risk categorisation. PTV_LR consisted of low–risk nodal volume, which excluded the node–positive cervical lymph node station, along with immediate lymph node stations above and below node node–positive station. This was prescribed to a dose of 54 Gy in 27 fractions. The radiotherapy volume was then coned down to PTV_IR, which included node–positive cervical lymph node stations, along with lymph node stations immediately above and below it, as well as the surgical bed, including the flap, if any. This was prescribed at a dose of 60 Gy in 30 fractions. The treatment volume was further coned down to the high–risk volume, which was defined by a volume encompassed by 1cm CTV around the GTV. This region was prescribed a dose of 66 Gy in 33 fractions.

Chemotherapy was given in the form of intravenous Cisplatin at a dose of 40 mg/m2 weekly, along with adequate hydration. A total of 6 cycles of concurrent chemotherapy was allowed. The spinal cord was limited to 44 Gy.

Assessment of toxicity (skin reaction, xerostomia, and mucositis) was done during RT every week and after completion of radiation, every 2 months up to 1 year, by Radiotherapy and Oncology Group (RTOG) criteria[14].

Results

In this study mean age of patients in the 3D–CRT group was 46.60±11.58 years, whereas the mean age of IMRT patients was 48.0±11.38 years. About one third of patients in the 3D–CRT group belonged to ≤40 and 41 to 50 years of age each whereas the maximum patients in the IMRT group belonged to the age range of 51 to 60 years (36.7%). In the present study, most patients in both the groups were male, i.e., 76.7% in the 3D–CRT group and 80% in the IMRT group. Females constituted only 23.3% in 3D–CRT and 20% of the study population in the IMRT group.

KPS grading was used to assess the functional status of patients. Most patients in the 3D–CRT group had KPS 80 (46.7%), followed by KPS 90 in 30% of patients, whereas 56.7% of patients in the IMRT group were observed to have KPS 70.

The maximum patients in the 3D–CRT group were residents of the urban area (53.3%), whereas the maximum patients in the IMRT group were residents of the rural area (56.7%).

Most patients in both groups were tobacco chewers, i.e., 70% in the 3D–CRT group and 96.7% in the IMRT group. About 16.7% and 3.3% of patients in the 3D–CRT group were addicted to smoking and alcohol, respectively.

Buccal mucosa (70%), followed by tongue (16.7%) and alveolus (13.3%) were the most common site of cancer in 3D–CRT group. Amongst the patients of IMRT group, tongue was the most common site of cancer (50%) followed by Buccal mucosa in 36.7% patients.

Most cancers in both groups were classified as stage IV A, 53.3% in the 3D–CRT and 36.7% in IMRT group. This was followed by stage III and IVB in 16.7% each in 3D–CRT group whereas in IMRT group 26.7% and 20% carcinoma were classified as Stage III and Stage IVB respectively.

In the 3D–CRT group, 73.3% of carcinomas were well differentiated and 26.7% were moderately differentiated squamous cell carcinomas based on the histopathological report. Similarly, amongst patients treated with IMRT, 70% and 30% of cancers were classified as well–differentiated and moderately differentiated squamous cell carcinoma.

The baseline characteristics of patients are depicted in Table 1.

The present study observed no statistically significant difference in the occurrence of mucositis at any follow–up. Mucositis was observed in both groups till 4 months following RT, but the difference observed was not statistically significant ($p>0.05$). Grade II mucositis was observed in 73.3% in 3D–CRT, whereas 63.3% of IMRT.

During RT, 40%, 46.7% and 6.7% patients were reported with grade I, II and III skin reaction respectively. In IMRT group, during RT skin reactions of grades I and II were noticed in 53.3% and 33.3% patients respectively. Test of significance observed no statistically significant difference in occurrence of skin reaction between two

Parameters		3D–CRT group	IMRT group	P value
Age (Year)		46.60±11.58	48.0±11.38	0.639
Male: Female		23:7	24:6	0.754
KPS score	70	7(23.3)	17(56.7)	0.031*
	80	14(46.7)	8(26.7)	
	90	9(30)	5(16.7)	
Habitat	Rural	14(46.7)	17(56.7)	0.438
	Urban	16(53.3)	13(43.3)	
Addiction	Tobacco	21(70)	29(96.7)	0.011*
	Smoking	5(16.7)	0(0)	
	Alcohol	1(3.3)	0(0)	
	None	3(10)	1(3.3)	
Tumor Site	Buccal Mucosa	21 (70)	11 (36.7)	0.003*
	Tongue	5 (16.7)	15 (50)	
	Alveolus	4 (13.3)	1 (3.3)	
	Gingivo–buccal sulcus	0 (0)	3 (10)	
Tumor stage	I	2 (6.7)	1 (3.3)	0.656
	II	2 (6.7)	4 (13.3)	
	III	5 (16.7)	8 (26.7)	
	IV A	16 (53.3)	11 (36.7)	
	IV B	5 (16.7)	6 (20.0)	
Histo–pathological Report	MDSCC	8 (26.7)	9 (30.0)	0.774
	WDSCC	22 (73.3)	21 (70.0)	

Table 1: Baseline characteristics of patients
#Data presented as Mean ± SD or Number (percentage); *P<0.05

Mucositis	Grade 0		Grade I		Grade II		Grade III		Grade IV	
	3DCRT	IMRT	3DCRT	IMRT	3DCRT	IMRT	3DCRT	IMRT	3DCRT	IMRT
During RT	2	2	2	7	22	19	3	2	1	0
2 months	6	4	0	3	22	18	2	5	0	0
4 months	26	29	3	0	1	1	0	0	0	0
6 months	30	30	0	0	0	0	0	0	0	0
8 months	30	30	0	0	0	0	0	0	0	0
10 months	30	30	0	0	0	0	0	0	0	0
12 months	30	30	0	0	0	0	0	0	0	0

Table 2: Distribution according to mucositis grading is shown in Table 2 and Figure 1.

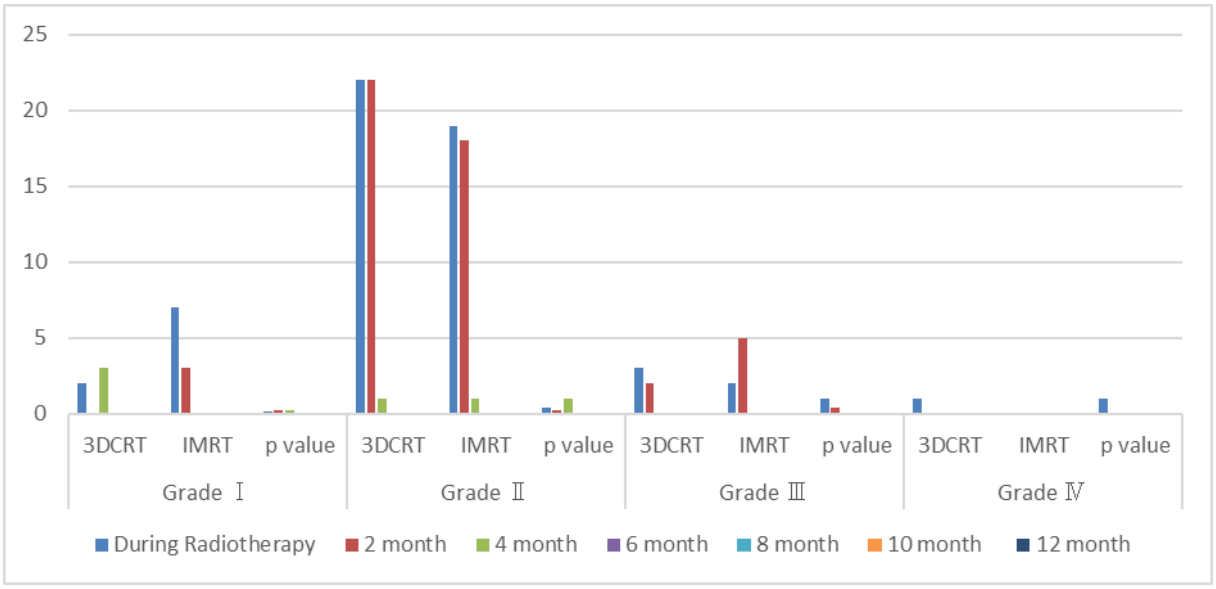


Figure 1: Distribution according to mucositis grading

Skin reaction	Grade 0		Grade I		Grade II		Grade III		Grade IV	
	3DCRT	IMRT	3DCRT	IMRT	3DCRT	IMRT	3DCRT	IMRT	3DCRT	IMRT
During RT	2	4	12	16	14	10	2	0	0	0
2 months	14	11	4	9	11	7	1	2	0	1
4 months	26	27	0	0	4	3	0	0	0	0
6 months	29	29	1	0	0	1	0	0	0	0
8 months	30	30	0	0	0	0	0	0	0	0
10 months	30	30	0	0	0	0	0	0	0	0
12 months	30	30	0	0	0	0	0	0	0	0

Table 3: Distribution according to skin reaction

groups ($p>0.05$), the occurrence of skin reactions was observed till 6 months in 3D–CRT as well as in IMRT.

Distribution according to skin reaction grading is shown in Table 3 and figure 2

No significant difference in occurrence of xerostomia was observed between the patients of 2 groups during RT and at 2 and 4 month follow up ($p>0.05$) but a statistically significant difference in occurrence of xerostomia was observed between the two groups from 6 to 10 months following RT ($p<0.05$). The occurrence of grade II xerostomia was almost equal in both the groups but the occurrence of grade III xerostomia was observed 33.3% patient of 3D–CRT and only 6.7% patient of IMRT.

Discussion

Radiotherapy is an essential modality in the management of patients with oral cavity cancer. Recent decades have witnessed the advancement of radiotherapy from two–dimensional radiotherapy to three–dimensional conformal radiotherapy (3D–CRT) and recently also to intensity–modulated radiotherapy (IMRT). These recent advances in radiotherapy treatment carried out keeping in mind to low toxicity to normal tissue along with better tumour control.

In our study, occurrence of mucositis was observed in both the groups till 4 months following RT. Twenty–eight patients developed some grade of mucositis during RT in both groups. The difference was observed between the two groups in grade II and more mucositis,

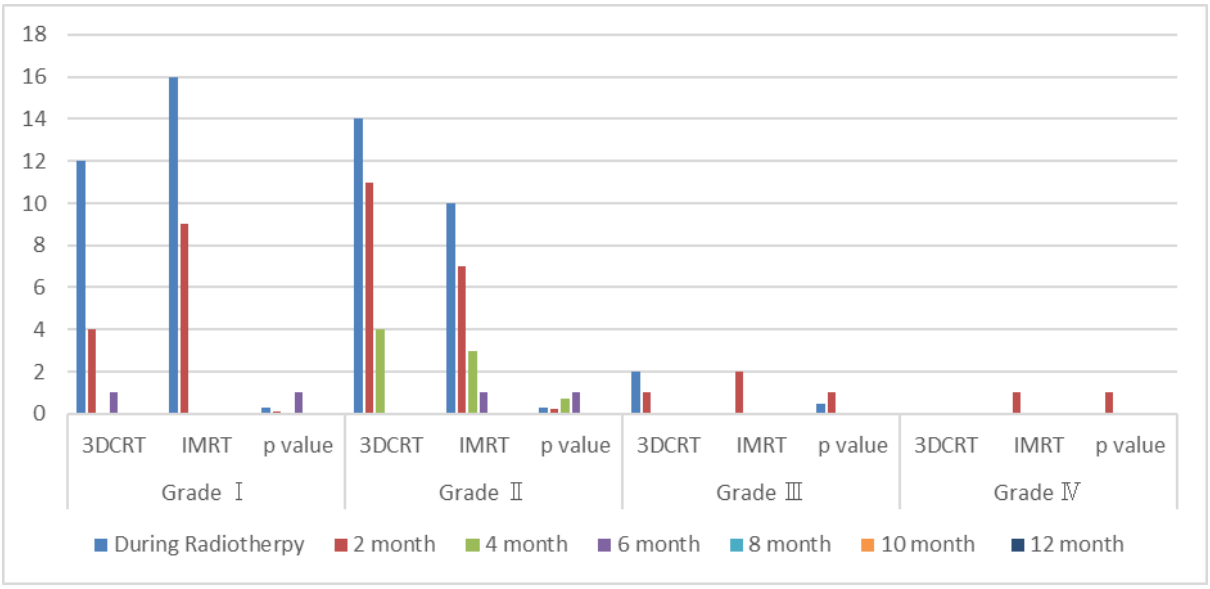


Figure 2: Distribution according to skin reaction

Xerostomia	Grade 0		Grade I			Grade II			Grade III			Grade IV	
	3DCRT	IMRT	3DCRT	IMRT	p value	3DCRT	IMRT	p value	3DCRT	IMRT	p value	3DCRT	IMRT
During RT	25	25	2	3	1	3	2	1	0	0		0	0
2 months	24	25	3	3	1	3	2	1	0	0		0	0
4 months	24	25	3	3	1	3	2	1	0	0		0	0
6 months	1	6	0	4	0.112	19	18	0.79	10	2	0.021*	0	0
8 months	3	7	0	4	0.112	18	17	0.793	9	2	0.042*	0	0
10 months	3	8	0	4	0.112	18	16	0.602	9	2	0.042*	0	0
12 months	6	10	0	2	0.492	15	16	0.796	9	2	0.042*	0	0

Table 4: Distribution according to Xerostomia grading is shown in table 4 and figure 3

which occurred in 86.66% of patients in 3D–CRT group whereas 70% of patients in IMRT group during RT. The difference observed could not be deemed statistically significant($p>0.05$). Grade ≥3 mucositis was observed in 13.3% of patients in 3D–CRT group, while only 6.6% developed mucositis of Grade ≥3 during RT. At 4 months Post RT, 13.3 % had mucositis of any grade in 3DCRT group, whereas only 3.33% still had mucositis in IMRT Group. These results observed is in congruence with that of Rawat N et al who also observed findings similar to present study. They observed grade ≥2 mucositis in 90% of 3D–CRT and 86.6% of IMRT arm and the difference between the arms was insignificant[15]. Clavel S et al also reported similar findings i.e., Grade 2 or greater acute mucositis in 75% patients with IMRT while it was 77% with 2–3D CRT[4]. Ghosh G et al observed Grade 3 or greater mucositis in 57.5% amongst the patients of 3D–CRT group and 40% patients of IMRT Group. This result is like our study as 3DCRT has numerically more patients with Grade ≥3 mucositis during RT compared to IMRT, though the percentage is considerably less in our study[16].

Skin reactions were observed in 28 patients treated with 3DCRT and 26 patients in IMRT group in our study, and the difference in occurrence of skin reactions between the two groups was again concluded insignificant ($p>0.05$).

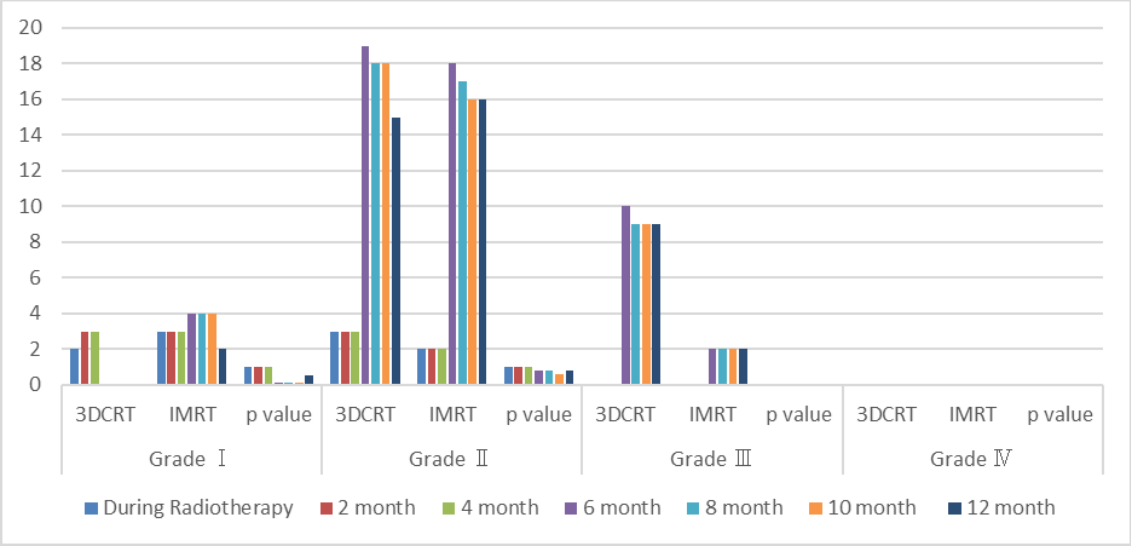


Figure 3: Distribution according to Xerostomia grading

During RT grade II or more skin reaction was observed in 53.33%and 33.3%patients in 3D–CRT and IMRT group respectively. The occurrence of skin reaction was observed till 6 months in both the groups, with equal occurrence i.e., 3.33%.

Rawat N et al in their study too observed insignificant difference between the two groups in occurrence of acute skin reactions, though numerically our study showed favorable percentages. They observed grade II or more skin reactions in 83.3% and 76.6% patients in 3D–CRT and IMRT group respectively during treatment duration or at the end of treatment[15]. Like these findings of present study, the occurrence of skin reactions was more in 3D–CRT group as compared to IMRT but the difference was not statistically significant in the study by Ghosh G et al also. They reported acute Grade 3 or greater toxic effects to the skin in 12.5% patients in 3D–CRT group compared to 7.5% patients in the IMRT group[15].

In present study, no significant difference in occurrence of xerostomia was observed between the patients of two groups during RT and at 2 and 4 month follow up ($p>0.05$) but a significantly higher incidence of xerostomia, specifically grade II or more xerostomia was observed in patients receiving 3D–CRT (96.6%) as compared to IMRT (66.6%) during 6 to 10 months following RT ($p<0.05$). The findings of our study were consistent with findings of study by Ghosh G et al, in which they observed statistically significant occurrence of xerostomia in 72.5% patients in 3D–CRT group and only 45% patients in IMRT group[16]. Rawat N et al observed xerostomia in all patients at treatment completion. However, at 6 months follow up post RT, they observed higher number of patients with grade 2 xerostomia in 3D–CRT arm (76.6%) as compared to IMRT group (56.6%)[15].

Conclusion

This study concluded that during or by the end of treatment for oral cavity cancer by RT – either by 3D–CRT or IMRT, no significant difference was observed in the acute toxicity reactions like Mucositis or skin reactions but there was significant difference in occurrence of higher grade (grade III) xerostomia from 6 months to 10 months, more in 3DCRT than IMRT. So, IMRT can be considered in the treatment of oral cavity cancer to prevent higher grade xerostomia.

Acknowledgement

None

Funding and Conflict of Interest

No conflict of interest

List of Abbreviations:

- **RT:** Radiotherapy
- **3D–CRT:** Three–Dimensional Conformal Radiotherapy
- **IMRT:** Intensity–Modulated Radiotherapy
- **HNSCC:** Head and Neck Squamous Cell Carcinomas
- **KPS:** Karnofsky Performance Scale
- **RTOG:** Radiotherapy Oncology Group
- **PTV:** Planning Target Volume
- **Gy:** Gray (unit of radiation dose)
- **MLC:** Multileaf Collimator
- **CTV:** Clinical Target Volume
- **GTV:** Gross tumour volume
- **CECT:** Contrast–enhanced computed tomography

Declarations

Ethics approval and consent to participate: Consent was obtained by all participants in this study. Institutional Ethics Committee, letter no. 3830–32/MC/IEC/2018.

Consent for publication: Not applicable.

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References

1. 900–world–fact–sheet.pdf.
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA A Cancer J Clinicians. 2021 May;71(3):209–49.
3. Al–Sarraf M. Head and neck cancer: chemotherapy concepts. Semin Oncol. 1988 Feb;15(1):70–85.
4. Clavel S, Nguyen DHA, Fortin B, Després P, Khaouam N, Donath D, et al. Simultaneous integrated boost using intensity–modulated radiotherapy compared with conventional radiotherapy in patients treated with concurrent carboplatin and 5–fluorouracil for locally advanced oropharyngeal carcinoma. Int J Radiat Oncol Biol Phys. 2012 Feb 1;82(2):582–9.
5. Mendenhall WM, Hinerman RW, Amdur RJ, Malyapa RS, Lansford CD, Werning JW, et al. Postoperative Radiotherapy for Squamous Cell Carcinoma of the Head and Neck. Clinical Medicine & Research. 2006 Sep 1;4(3):200–8.
6. Bernier J, Domenge C, Ozsahin M, Matuszewska K, Lefèbvre JL, Greiner RH, et al. Postoperative Irradiation with or without Concomitant Chemotherapy for Locally Advanced Head and Neck Cancer. N Engl J Med. 2004 May 6;350(19):1945–52.
7. Cooper JS, Pajak TF, Forastiere AA, Jacobs J, Campbell BH, Saxman SB, et al. Postoperative Concurrent Radiotherapy and Chemotherapy for High–Risk Squamous–Cell Carcinoma of the Head and Neck. N Engl J Med. 2004 May 6;350(19):1937–44.
8. Hosni A, Chiu K, Huang SH, Xu W, Huang J, Bayley A, et al. Non–operative management for oral cavity carcinoma: Definitive radiation therapy as a potential alternative treatment approach. Radiotherapy and Oncology. 2021 Jan;154:70–5.
9. Cooper JS, Zhang Q, Pajak TF, Forastiere AA, Jacobs J, Saxman SB, et al. Long–term follow–up of the RTOG 9501/intergroup phase III trial: postoperative concurrent radiation therapy and chemotherapy in high–risk squamous cell carcinoma of the head and neck. Int J Radiat Oncol Biol Phys. 2012 Dec 1;84(5):1198–205.
10. Lang K, Baur M, Held T, Shafie RE, Moratin J, Freudlsperger C, et al. Definitive radiotherapy for squamous cell carcinoma of the oral cavity: a single–institution experience. Radiol Oncol. 2021 Nov 19;55(4):467–73.
11. Scher ED, Romesser PB, Chen C, Ho F, Wuu Y, Sherman EJ, et al. Definitive chemoradiation for primary oral cavity carcinoma: A single institution experience. Oral Oncol. 2015 Jul;51(7):709–15.
12. Lee N, Xia P, Fischbein NJ, Akazawa P, Akazawa C, Quivey JM. Intensity–modulated radiation therapy for head–and–neck cancer: the UCSF experience focusing on target volume delineation. Int J Radiat Oncol Biol Phys. 2003 Sep 1;57(1):49–60.
13. Bucci MK, Bevan A, Roach M. Advances in radiation therapy: conventional to 3D, to IMRT, to 4D, and beyond. CA Cancer J Clin. 2005;55(2):117–34.
14. Cox JD, Stetz J, Pajak TF. Toxicity criteria of the Radiation Therapy Oncology Group (RTOG) and the European organization for research and treatment of cancer (EORTC). International Journal of Radiation Oncology*Biology*Physics. 1995 Mar;31(5):1341–6.
15. Department of Radiotherapy, Acharya Tulsi Regional cancer Treatment and Research Institute, S.P. Medical College, Bikaner 334001, India, Kumar DHS. Comparison of acute toxicities in patients of Head and Neck Cancer treated by 3D–CRT v/s IMRT. jmscr [Internet]. 2018 Dec 25 [cited 2025 May 15];6(12). Available from: http://jmscr.igmpublication.org/v6–i12/130%20jmscr.pdf
16. Ghosh G, Tallari R, Malviya A. Toxicity Profile of IMRT Vs. 3D–CRT in Head and Neck Cancer: A Retrospective Study. J Clin Diagn Res. 2016 Sep;10(9):XC01–3.

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