International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 9; Issue 05(D); May 2020; Page No.22276-22281
DOI: http://dx.doi.org/10.24327/ijcar.2020.22281.4388

Research Article

A PROSPECTIVE INTERVENTIONAL STUDY OF SPLIT-COURSE ACCELERATED HYPOFRACTIONATED RADIOTHERAPY (SCAHRT) FOR LOCOREGIONALLY ADVANCED HEAD AND NECK CANCER(LAHNC)

Dadhich Prashant, Dana Rohitashwa, Gothwal R.S, Kumar Pawan and Chaturvedi Manish

Department of Radiation Oncology SMS Medical College, Jaipur, Rajasthan, India

A R T I C L E I N F O

Article History:
Received 06th February, 2020
Received in revised form 14th March, 2020
Accepted 23rd April, 2020
Published online 28th May, 2020

Key words:

Therapy (CCRT),(LRC) ,LAHNC (SCAHRT).

A B S T R A C T

Introduction: Achieving locoregional control in high-risk patients with head and neck cancer who are poor candidates for standard Concurrent Chemo-Radio-Therapy (CCRT) due to advanced age, comorbidities, or very advanced disease is challenging. In an effort to safely achieve locoregional control (LRC) in LAHNC patients, in our institution we experienced this planned split-course regimen of accelerated Hypofractionated radiotherapy (SCAHRT).

Patients and Methods: The SCAHRT regimen was used for patients with advanced age, significant co-morbidities, anticipated intolerance to definitive (chemo) radiation. EBRT of 30 Gy is delivered in 10 fractions with 3 Gy per fraction in phase I. This is followed by at least 4 week gap to allow for recovery from toxicity and the II phase is delivered by 30 Gy/10 fractions with same dose fractionations. Considering available error of 15% in response rate, the required sample size is taken 50 patients of LAHNC.

Results: 48 out of 50 patients are being gone for assessment of results in form of tumor response, toxicities and compliance. RECIST Criteria (Response Evaluation Criteria In Solid Tumors) version 1.1.is being used for tumor response and National Cancer Institute's Common Terminology Criteria for Adverse Events (CTCAE) version 4.0.3 is being used for toxicities assessment. Locoregional control in term of response was 90.6%{CR,n=32(74%) and PR,n=7(16.25%)} at the primary site and 86%{CR,n=20(46.5%) and PR,n=17(39.5%)} at Nodal site. In both phases 96% patients completed phase I (30Gy/10 Fr) and phase II (30 Gy/10Fr) with atleast 4 weeks gap with minimum toxicities. SCAHRT was well tolerated by most patients due to gap between fractions to allow for normal tissue healing.

Conclusion: Our effort is for establishment of evidence that SCAHRT is a safe, well-tolerated and effective method of achieving durable locoregional disease control and effective palliation in these high risk LAHNC patients, those are not suitable for definitive CTRT.

INTRODUCTION

The incidence of HNC is exceptionally high in India in comparison with that of the developed countries (around 6%). More than 0.3 million new cases are diagnosed each year[1,2]. Males are more commonly affected than females and it implicates the increased use of tobacco and betel nuts in them. In India, 60% to 80% of patients are present with advanced disease as compared to 40% in developed countries[3,4,5,27].

Oral cancer is the most common type of HNC which elucidates over 30% of all HNC in the country[5,6]. According to the GLOBOCAN 2018, the incidence of HNC (particularly oral cavity and lips) in India is 1,19,992 and mortality is 72,616.

Corresponding author:* **Dadhich Prashant
Department of Radiation Oncology SMS Medical College, Jaipur, Rajasthan, India

Although HNC occurs in the 6th and 7th decades of life, recent reports suggested the increasing trend towards age less than 45 years because of increasing incidence of Human Papillomavirus (HPV) infection[6]. Organ-preservation protocols using combined chemo-radiation (combined systemic treatment with cisplatin and loco-regional radiation) have become the standard of care for Locally Advanced Head And Neck Cancer (LAHNC). Palliative radiotherapy is a reasonable treatment option in patients with when treatment of locally advanced disease with curative intent is not possible due to comorbidity or poor performance status (PS)[9,12]. In those advanced head and neck cancer patients, standard care is not feasible, the hypo fractionated regimen has been used to control their locoregional disease and to alleviate symptoms[12,13,14,15] Retrospective studies about the Split Course Accelerated Hypo fractionated Radiotherapy (SCAHRT) find that the SCAHRT is a safe and well-tolerated regimen in

LAHNC cases whose are not suitable for standard CCRT.[23] In an effort to achieve locoregional control (LRC) in LAHNC patients, we prospectively treated LAHNC cases with this split-course regimen of accelerated Hypo fractionated radiotherapy (SCAHRT) and assess the toxicities and compliance in Department of Radiation Oncology, S.M.S Medical College and attached group of hospital, Jaipur, Rajasthan, India.

MATERIALS AND METHODS

This prospective study was conducted in Department of Radiation Oncology, S.M.S Medical College and attached group of hospital, Jaipur, Rajasthan from June 2018 to May 2019.Locoregionally advanced head and neck cancer patients to be included in the study was histopathologically proven (AJCC stage III – IVB) which was not suitable for definitive chemoradiotherapy. We excluded patients of head and neck malignancies of nasopharynx, skin, nose, thyroid, salivary gland, sarcomas and lymphomas, patient with distant metastases, prior radiotherapy at head and neck region and cases with double malignancy. Considering available error of 15% in response rate, the required sample size was 45 patients of LAHNC. Assuming 20% dropout/ lost to follow up, 60 patients was enrolled in the present study. Newly diagnosed patients were treated with two phases of split course accelerated Hypofractionation on Bhabhatron II Cobalt 60 Teletherapy machine. Treatment was delivered in supine position with proper immobilization with parallel opposed field for the primary and nodal site for lower neck. EBRT of 30 Gy was delivered in 10 fractions with 3 Gy per fraction per day in phase I. This was followed by 4 weeks gap to allow for recovery from toxicities then II phase was delivered by 30 Gy/10 fractions with same dose fractionations.

Patients was evaluated for toxicity weekly during radiation and then after completion of SCAHRT at initially monthly and subsequently at three months and six months intervals. Toxicities appearing within 90 days of the start of therapy was considered acute toxicities, skin reaction, mucositis and dysphagia was graded according to the Radiation Therapy Oncology Group (RTOG) acute and chronic radiation morbidity criteria, whereas hematological toxicities was graded according to the National Cancer Institute's Common Terminology Criteria for Adverse Events (CTCAE) version 4.03.Response evaluation was done after 6 mon of completion of SCAHRT treatment based on clinical examination and CECT/MRI of head as per RECIST Criteria (Response Evaluation Criteria In Solid Tumors) version 1.1.

OBSERVATIONS AND RESULTS

Patients' characteristics: 60 patients were enrolled in study but results were obtained from 50 patients. 10 patients did not complete their treatment.50 patients (46 males and 4 females) were treated with SCAHRT but only 48 patients were completed both I and II phase of SCAHRT and follow-up for patients overall was 6 months. Distribution of cases according to age group were 40% (n=20) in age group of 30 to 40 years, 26.0% (n = 13) in the age group of 41 to 50years followed by 34% (n = 17) in the age group of 51-70 years, the mean age of patients was 47.42±11.99 years. 84% cases were belonging to rural areas in whom 62% were related to non-serviced occupation followed by 22% for agriculture related occupation and rest 16% were urban people belonging to serviced class. 62% were have personal history of Smoking followed by 36% had habit of Chewing of tobbaco.2% cases had habit of both tobacco chewing and smoking. According to anatomical site, we have found that 78% patients were of oral cavity carcinoma followed by 18% of Oropharynx and 4% had recurrence of oral cavity carcinoma.. In which 46% were Buccal Mucosa anatomical sub site followed by 22% Tongue then 10% for Tonsil. The most common tumors were squamous cell carcinomas (98%).

Table no 1.is shown distribution of cases according to tumor grade, ECOG performance status (PS), gap between phase I and II, requirement of Nasogastric tube.

Treatment characteristics*:* Both phases of treatment were completed in 48 out of 50 (96%) patients. Two patients did not complete the second course of treatment due to unknown reasons and lost follow up. All patients was treated the regimen consisted of two courses with split course accelerated Hypo fractionation on Cobalt 60 Teletherapy. EBRT of 30 Gy was delivered in 10 fractions with 3 Gy per fraction in phase I. This was followed by gap to allow recovery from treatment related toxicities then II phase was delivered by 30 Gy/10 fractions with same dose fractionations. Gap between phase I and phase II was 5 weeks in 24 (48%) patients, 4 weeks in 19(38%) patients and 6 weeks in 5(10%) patients.

Table 1 Distribution of the cases

	Number	Total	Percentage (%)	
TU GRADE				
Poorly diff.(3rd)	8		16	
Mod.diff.(2nd)	25	50	50	100
Well diff.(1st)	17		34	
ECOG performance status				
1	36	50	72	100
2	14		28	
RT dose fractionation				
Phase I	2	50	4	100
Phase I+II	48		96	
Gap between phase I & II(in weeks)				
4	19		38	
5	24	50	48	100
6	5		10	
Not completed	2		4	
Nasogastric tube insertion				
Yes	22	50	44	100
No	28		56	

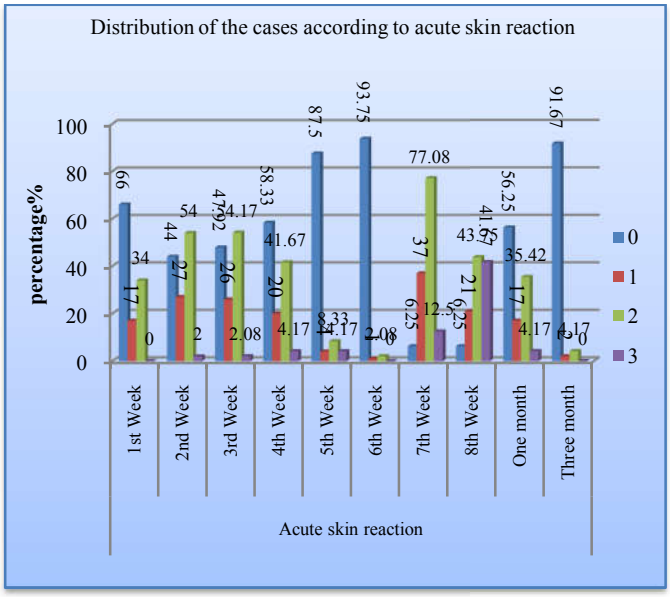
Toxicity and Compliance: All 48(96%) patients completed phase I (30Gy/10 Fr) and phase II (30 Gy/10Fr) with at least 4 weeks gap. SCAHRT was well tolerated by most of the patients given the gap between fractions to allow for normal tissue healing. This is important since toxicities resulting from treatment should be minimal and no grade 4 or 5 radiotherapy toxicities were observed during or after treatment. Twenty-two (44%) patients required a feeding tube at some point during treatment.

Toxicities in terms of skin reactions, mucositis, dysphagia, nausea, vomiting and hematological effects were assessed according to RTOG acute toxicity grading criteria. In term of acute skin reaction among 48 patients in study group in the 1st week 66% were in the 0 Grade and 34% in Grade I , increased up to 54% in 2nd week. Skin toxicity was reduced after wards due to gap given between two phases. In 7th week grade II skin toxicity was observed in 12.5% of patients when II phase was started and which increased up to 41% by 8th week. This

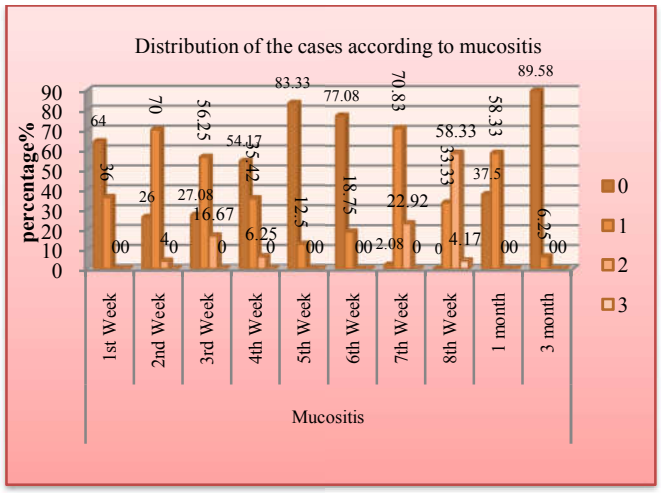
implies that initially reaction progressively increased up to 8 weeks then decreased with the follow up time. Grade III skin toxicity was observed in only 4% of patients in 8th week. No grade IV and V toxicities were found. These observations were statistically significant (P<0.001S). Chi-square = 279.176 with 36 degrees of freedom; P <0.001S.

Table 2 Distribution of the cases according to acute skin reaction

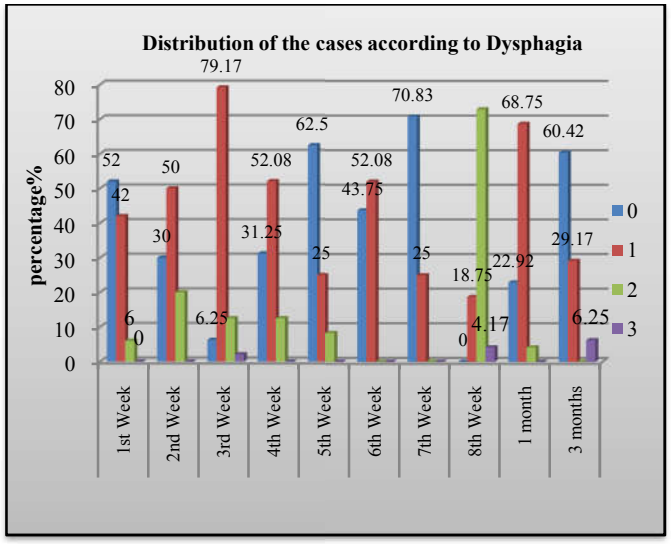
Acute skin reaction (RTOG grade)	0	%	1	%	2	%	3	%	Blank	Total (N=50)
1st Week	33	66	17	34	0	0	0	0	0	50
2nd Week	22	44	27	54	1	2	0	0	0	50
3rd Week	23	47.92	26	54.17	1	2.08	0	0.00	0	48
4th Week	28	58.33	20	41.67	2	4.17	0	0.00	0	48
5th Week	42	87.50	4	8.33	2	4.17	0	0.00	0	48
6th Week	45	93.75	1	2.08	0	0.00	0	0.00	2	48
7th Week	3	6.25	37	77.08	6	12.50	0	0.00	2	48
8th Week	3	6.25	21	43.75	20	41.67	2	4.17	2	48
One month	27	56.25	17	35.42	2	4.17	0	0.00	2	48
Three month	44	91.67	2	4.17	0	0	0	0.00	2	48



In terms of mucositis, grade I toxicity was observed in 36% cases in 1st week of treatment which increased up to 70% in 2nd week and subsided afterwards and 72% and 36% in 7th and 8th week respectively during II phase. Highest Grade II toxicity was observed in 8th week of treatment up to 56%. 4% patients developed grade III toxicity during 8th week of treatment. These observations were observed statistically significant (P<0.001S).



Distribution of the cases according to Dysphagia, it was found that in the 1st week 52% of the cases belonged to grade 0 followed by 42% of cases for grade I and so on. Here Chi-square = 388.833 with 36 degrees of freedom; P <0.001S is significant.



SCAHRT is well tolerated regimen with excellent compliance. Out of 50, 48 patients had completed both phase of treatment with minimum toxicities. 38% of the cases grouped under 4 weekly Gap between Phase I and II followed by 48% for 5 weeks gap and only 10% for 6 week gap.

5 patients were died after 3 months of completion of treatment due to non treatment related reasons so final results were assessed in 43 patients at 6 months of follow up.

Response

Tumor response was recorded with the help of clinical examination, direct and indirect laryngoscopy and imaging according to RECIST criteria after 1 month,3 months and 6 months of SCAHRT completion.

Table 3 Distribution of the case according to Response (RECIST) Primary

Response (RECIST)	1 Month		3 Months		6 Months		p-value
	No.	%	No.	%	No.	%	
CR	7	14.6	34	70.83	32	74.42	<0.01 S
PD	0	0	4	8.33	4	9.30	
PR	37	77.1	10	20.83	7	16.28	
SD	4	8.3	0	0.00	0	0.00	
Total	**48**	**100**	**48**	**100.00**	**43**	**100.00**	

As shown in Table No.8 clinical response rates for primary site obtained after 6 months of treatment revealed that complete response (CR) was achieved in 32 patients (74.42%), Partial response (PR) in 7 patients (16.28%) . Overall response rate (CR + PR) was 90.7% in the Study group. Both CR and PR rates were found to be statistically significant (p-value <0.01). Four patients in the Study group developed progressive disease (PD) after completion of SCAHRT and no patient had Stable disease (SD).

Table 4 Distribution of the cases according to response (RECIST) nodal

	1 Month		3 Months		6 Months		p-value
	No.	%	No.	%	No.	%	
CR	5	10.42	20	41.66	20	46.5	
PD	0	0	4	8.33	4	9.3	<0.001 S
PR	38	79.16	22	45.83	17	39.5	
SD	5	10.42	2	4.16	2	4.6	
Total	**48**	**100**	**48**	**100**	**43**	**100**	

As shown in the above Table No.9 clinical response rates for nodal site obtained after 6 months of treatment follow up, revealed that complete response (CR) was achieved in 20 patients (46.5%), partial response (PR) in 17 patients (39.5%) in Study group. Overall response rate (CR + PR) was 86% in the Study group. Both CR and PR rates were found to be statistically significant (p-value <0.001). Four patients in the Study group developed progressive disease (PD) after completion of SCAHRT, whereas two patients had Stable disease (SD).

DISCUSSION

A vast majority of Head and Neck Squamous cell cancers (HNSCC) in India present in advance stages and has poor tolerance for multimodality treatment due to loco regionally advanced disease, poor nutrition status, poor performance status or distant metastatic disease. Currently, there is no consensus or guideline for palliative RT for patients with locally advanced head and neck cancer(LAHNC).

Hypo fractionated regimens have been used for palliation of LAHNC due to radiobiological advantages (large dose per fraction), shorter overall treatment time, logistical convenience and limited life expectancy in this group of patients. From a radiobiological perspective, limiting the overall treatment time is known to lead to increased tumor cell killing and improved outcomes in HNC. The increased potential for late side effects with hypo fractionated radiotherapy is less relevant due to limited life expectancy in this group of patients.[13, 27]

Many regimens have used split course hypo fractionated approach to escalate the dose in LAHNC patients to provide palliation and to alleviate symptoms with acceptable toxicity.

In the present study which was performed at Department of Radiation Oncology, S.M.S Medical College and attached group of hospital, Jaipur, Rajasthan, we prospectively treated LAHNC cases with Split Course Accelerated Hypofractionated Radiotherapy (SCAHRT).In this protocol we had treated 50 patients those were registered in our department and fitted in inclusion criteria such as advanced age, lower performance status, other comorbidities and not fitted in the criteria for definitive treatment.

We enrolled 60 patients with LAHNC stage III-IVB in our study but only 48 patients were completed both phases of radiotherapy and were eligible for final analysis. The reasons, for not completing treatment were worsening of PS and comorbidity in 6 patients,2 patients refused further radiotherapy due to treatment related toxicities,2 patients lost to follow up and 2 patients died after completion of I phase of SCAHRT due to non treatment related reasons.

Treatment was delivered by using Bhabhatron II Cobalt 60 EBRT technique. EBRT of total 30 Gy in 10 fractions were delivered in I phase with 3 Gy per fraction per day which was followed by 4 weeks (maximum 6 weeks) gap to allow for recovery from toxicity. In II phase 30 Gy in 10 fractions were delivered with same dose fractionations. Main objective of our study was to assess the locoregional control in terms of response at primary site and for nodal region with toxicities assessment during SCAHRT.

Response

Response was assessed by using RECIST criteria after completion of SCAHRT which was 90.6%{CR 32(74%) and PR 7(16.25%)} at the primary site and 86%{CR 20(46.5%) and PR 17(39.5%)} at Nodal site. The tumor response rate in present study compares favorably to those of other published studies.[13,16,17,18,21,29]

Murthy *et al*. in his schedule of 32Gy/8 fractions/twice weekly obtained overall response rates of 42% at primary site and 55% at nodal site.[13]Minatel *et al*. in their study have reported local tumor response rates of 69% with a split course radiotherapy (50 Gy in 20 fractions) with bleomycin in inoperable head and neck cancer patients.[29] Whereas Mudgal A, *et al* performed a study in which all patients received 40 Gy in 10 fractions, twice weekly by two lateral fields covering primary and secondary diseaspe. After completion of treatment, good objective response was seen in 82.6% and 84.7% at tumor and nodal sites, respectively, with minimal toxicity.[16] Jakhar, *et al* in their study evaluated the effect of an accelerated hypo fractionated 4 days schedule (octa shot) in providing palliation to such advanced cases of head and neck cancer. After completion of radiotherapy, first response evaluation done at 15th day showed ≥50% objective response in 14 patients. At 1 month, this response increased to ≥75% in 16 patients and 50%–75% in three patients[21]. In the same institute Spartacus, *et al* treated 98 patients with palliative radiotherapy 25 Gray (Gy)/4 fractions (fr)/1 fraction (6.25 Gy)/week. Tumor complete response (CR) was seen in 2 patients, partial response in 89, stable disease in 3, and progressive disease in 4 patients[12].

When tumor response rate is compared in all these studies , present study has better results because patients are treated to higher total doses of radiation in SCAHRT. In present study EQD2 is 65 Gy, which is quite high than other comparative regimens. Other comparable palliative regimen EQD2 range is 37.33 to 52.08 Gy.

Compliance and toxicities

We have found that compliance and tolerability of schedule is excellent for patients. In both phases 96% patients completed phase I (30Gy/10 Fr) and phase II (30 Gy/10Fr) with 4 weeks gap. SCAHRT was well tolerated by most patients due to gap between fractions to allow for normal tissue healing. There was no significant change in the performance status.44%

patients required feeding tube insertion. There was minimal grade 3 or above mucositis, dermatitis or hematological toxities.

Regarding skin toxicity in study group in the 1st week, 66% patients had Grade 0 and 34% Grade I skin toxicity which increased up to 54% in 2nd week. Skin toxicity was reduced after wards due to gap given between two phases. In 7th week grade II skin toxicity was observed in 12% of patients, when II phase was started and which increased up to 40% in 8th week. This implies that initially reaction progressively increased up to 8 weeks then decreased with the follow up time. Grade III skin toxicity was observed in only 4% of patients in 8th week. No grade IV toxicities were found.

In terms of mucositis, grade I toxicity was observed in 36% cases in 1st week of treatment which increased up to 70% in 2nd week and subsided afterwards and 72% and 36% in 7th and 8th week respectively during II phase. Highest Grade II toxicity was observed in 8th week of treatment up to 56%. 4% patients developed grade III toxicity during 8th week of treatment.

Distribution of the cases according to Dysphagia, it was found that in the 1st week 52% of the cases belonged to grade 0 followed by 42% of cases for grade I which increased up to 79% in 2nd week and subsided afterwards. Highest Grade II toxicity was observed in 8th week of treatment up to 72%. 4% patients developed grade III toxicity during 8th week of treatment.

Our regimen was well tolerated with only 4% of patients having Grade III toxicity while no patient had Grade IV toxicity.

The toxicity profile of this regimen also compares favorably with similar studies for palliative radiotherapy in LAHNC. In Murthy *et al* study 50% patients developed grade II mucositis and only 1 (1.2%) patient developed grade III mucositis. None of the patients developed grade III skin toxicity while 45% patients developed grade II skin toxicity. Whereas Agarwal *et al*. reported 63% grade III mucositis and 14% grade III dermatitis in their study using a BED of 50 Gy for acute effects.[30] Incidence of grade III mucositis and dermatitis and pain was 18%, 3%, in a study by Das *et al*.[15] Only two patients reported Grade III mucositis; remaining patients had mucositis and dermatitis up to Grade II in a study by Jakhar *et al,* to evaluate the effect of an accelerated hypofractionated 4 days schedule (octa shot). Thakur *et al,* observed toxicities as Grade I 80/117 (68.4%), Grade II 20/117 (17.1%), and Grade III as 17/117 (14.5%). A dose of 35 Gy in 15# 3 weeks was initially prescribed. After planned treatment break of 2 weeks, an additional dose of 25 Gy in 10# 2 weeks was delivered[31].

As compare to other hypofractionated regimen SCAHRT was well tolerated because there was a gap of 4 wks after giving 30 Gy in 10# in I phase. I phase radiation dose was a good equivalent dose for palliation of symptoms and reduction of bulk of tumor. Patients had good tolerance to this dose and this further helped to escalate the dose so that response at primary site could be improved. As results show in present study tumor response was better than other regimens.

Split course nature of radiation regimen leads to reduced toxicities which in turn make this regimen extremely acceptable to patients.

Due to short median follow-up it is not possible to draw any conclusion related to late toxicities and overall survival in the current study.

CONCLUSION

Vast majority of Head and Neck Squamous cell cancers (HNSCC) in India present in advance stages and has poor tolerance for multimodality treatment due to loco regionally very advanced disease, poor performance status and associated comorbidities. SCAHRT was a safe and effective treatment regimen in which EBRT of total 30 Gy in 10 fractions were delivered in I phase with 3 Gy per fraction per day which was followed by 4 weeks (maximum 6 weeks) gap to allow for recovery from toxicity. In II phase 30 Gy in 10 fractions were delivered with same dose fractionations. Main objective of our study was to assess the locoregional control in terms of response at primary site and for nodal region with toxicities assessment during SCAHRT. We were able to achieve reasonably high dose at tumor site with better locoregional control in term of response along with manageable toxicities as compare to other palliative regimen. SCAHRT offers the potential for long- term LRC in addition to effective palliation with minimum toxicities and improved quality of life. SCAHRT is well tolerated with excellent compliance. Large sample size and long duration of follow up are required to draw any definitive conclusion.

BIBLIOGRAPHY

1. GLOBOCAN 2002: Cancer Incidence, Mortality and Prevalence Worldwide. IARC Cancer Base No. 5. Version 2.0," IARC Press, Lyon, 2004.
2. Jemal A, Siegel R and Ward E, "Cancer Statistics," *CA*: *A Cancer Journal for Clinicians*, Vol. 57, No. 1, 2007, pp. 43-66.
3. Head and neck cancer in India. Available from http:/www. Veedaoncology. Com/PDF- document/Head Neck%2 0% cancer% 20In% 20India.pdf.
4. GLOBOCAN 2012, Cancer incidence, mortality, and prevalence worldwide. International agency for research on cancer. http:/globocan.iarc.fr/Pages/facts_sheets_cancer.aspx.
5. Global Cancer Statistics 2018:Freddie Bray, BSc, MSc, PhD; Jacques Ferlay, CA CANCER J CLIN 2018;68:394–424
6. Elango JK1, Gangadharan P, Sumithra S, Kuriakose MA.Trends of head and neck cancers in urban and rural India.Asian Pac J Cancer Prev. 2006 Jan-Mar;7 (1):108-12.
7. Akheel Mohammad, Incidence of Head & Neck Cancers in Western India: A Cancer Center Based Retrospective Analysis IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 2 Ver. 10 February. (2018), PP 30-34
8. Winquist E, Agbassi C, Meyers BM, Yoo J, Chan KKW;HeadandNeckDiseaseSite Group. Systemic therapy in the curative treatment of head and neck squamous cell cancer: a systematic review. J Otolaryngol Head Neck Surg 2017;46:29
9. Koch WM1, Lango M, Sewell D, Zahurak M, Sidransky D.Head and neck cancer in nonsmokers: a distinct clinical and molecular entity.Laryngoscope. 1999 Oct;109 (10):1544-51.

10. Michael Laursen, Lena Specht, Claus Andrup Kristensen, Anita Gothelf, Mogens Bernsdorf, Ivan Vogelius An Extended Hypofractionated Palliative Radiotherapy Regimen for Head and Neck Carcinomas, https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC6004383/#
11. Pignon JP, Bourhis J, Domenge C, Designe L. Chemotherapy added to locoregional treatment for head neck squamous cell cancer: Three Meta analyses of updated individual data. MACH-NC Collaborative Group. Meta Analyses of Chemotherapy on Head and Neck cancer. Lancet 2000;355:949-55.
12. Spartacus RK, Dana R, Rastogi K, Bhatnagar AR, Daga D, Gupta K. Hypo fractionated radiotherapy for palliation in locally advanced head and neck cancer. Indian J Palliat Care 2017;23:313-6.
13. Murthy V, Kumar DP, Budrukkar A, Gupta T, Ghosh-Laskar S, Agarwal J. Twiceweekly palliative radiotherapy for locally very ad vanced head and neck cancers. Indian J Cancer 2016;53:138-41.
14. Pandey KC, Revannasiddaiah S, Pant NK, Nautiyal V, Rastogi M, Gupta MK. Palliative radiotherapy in locally advanced head and ne ck cancer after failure of inductionchemotherapy: comparison of two fractionation schemes. Indian J Palliat Care 2013;19:139-45
15. Das S, Thomas S, Pal SK, Isiah R, John S. Hypo fractionated Palliative Radiotherapy in Locally Advanced Inoperable Head and Neck Cancer: CMC Vellore Experience. Indian J Palliat Care 2013;19:93-8.
16. Mudgal A, Arya AK, Yadav I, Chaudhary S. Role of hypo fractionated palliative radiotherapy in patients with stage four head-and-neck squamous cell carcinoma. J Can Res Ther 2019;15:528-32
17. Kancherla KN, Oksuz DC, Prestwich RJ, Fosker C, Dyker KE, Coyle CC, *et al*. The role of split-course hypo fractionated palliative radiotherapy in head and neck cancer. Clin Oncol (R Coll Radiol) 2011;23:141-8.
18. Chen AM, Vaughan A, Narayan S, Vijayakumar S. Palliative radiation therapy for head and neck cancer: toward an optimal fractionation scheme. Head Neck 2008;30:1586-91. Fowler J F, "21 years of Biologically Effective Dose" The British Journal of Radiology, 83 (2010),554-568
19. Corry J, Peters LJ, Costa ID, Milner AD, Fawns H, Rischin D, *et al*. The 'QUAD SHOT'a phase II study of palliative radiotherap y for incurable head and neck cancer. Radiother Oncol 2005;77:137-42.
20. Lok BH, Jiang G, Gutiontov S, Lanning RM, Sridhara S, Sherman EJ, *et al*. Palliative head and neck radiotherapy with the RTOG 8502 regimen for incurable primary or metastatic cancers. Oral Oncol 2015;51:957-62.
21. Jakhar SL, Purohit R, Solanki A, Murali P, Kothari T, Sharma N, *et al*. Accelerated hypofractionation (OCTASHOT): Palliative radiation schedule in advanced head and neck carcinoma. J Can Res Ther 2017;13:943-6.

How to cite this article:

Dadhich Prashant *et al* (2020) 'A Prospective Interventional Study of Split-Course Accelerated Hypofractionated Radiotherapy (Scahrt) for Locoregionally Advanced Head and Neck Cancer(Lahnc)', *International Journal of Current Advanced Research,* 09(05), pp. 22276-22281. DOI: http://dx.doi.org/10.24327/ijcar.2020.22281.4388

****