World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 5.088

EFFECT OF RADIATION THERAPY ON SWALLOWING ABILITIES IN NONLARYNGEAL CANCER PATIENTS

Feby Sabu*[1], Sona M. T.[2], Aleena Mary Jacob[2], Krishnapriya K. P.[2] and Amritha Ashok[2]

[1]Assistant Professor, Maps College, Mangalore.
[2]Student, Maps College, Mangalore.

***Corresponding Author: Feby Sabu**
Assistant Professor, Maps College, Mangalore.

Article Received on 23/08/2018 **Article Revised on 13/09/2018** **Article Accepted on 04/10/2018**

ABSTRACT

Introduction: The purpose of this study was to investigate swallowing measures in participants undergoing radiation therapy for head and neck cancer. An insight on these measures would provide adequate information on rehabilitation measures that can be designed for these participants post treatment. **Materials and Method:** 14 participants with non-laryngeal head and neck cancer, posted for radiation therapy was taken for the study. Swallowing measures were carried out on pretreatment and post radiation therapy treatment using Manipal Manual of Swallowing (MMSA). **Results and Discussions:** The study revealed significant differences when pretreatment and post treatment swallowing measures were compared (P< .005). Post treatment measures were noted to be higher compared to pretreatment. **Conclusion:** Present study indicated that radiation therapy for non-laryngeal head and neck cancer has a significant effect on swallowing measures as seen MMSA. Hence these participants can be provided with immediate swallowing rehabilitation post treatment based on the findings.

KEYWORDS: Head and neck cancer; Radiation therapy; Manipal Manual of Swallowing, swallowing abilities.

INTRODUCTION

Swallowing is a term used to describe all aspects of feeding which includes the trigger of swallow reflex, pharyngeal phase of swallow, and esophageal stage of swallow.[1] Swallowing difficulty may occur due to different structural or functional conditions such as stroke, cancer, neurologic disease, etc. One such condition which affect swallowing is treatment of head and neck cancer using radiation therapy. Swallow measures help in understanding, swallowing difficulties at different phases of swallow and its related deficits. It further aids in the management of these participants.

Radiotherapy uses focused energy (referred to as dose) to abolish the chemical bonds within the genetic material of cancerous cell. Consequently these cells lose their ability to replicate and in turn lead to its death preventing formation of new cancerous cells. Even though this treatment regimen has efficient treatment satisfaction, it also causes lots of side effects. Along with other side effects such as dermatitis, voice changes, lack of appetite, reduced taste, fatigue, tissue fibrosis etc, radiation therapy also causes dysphagia (swallowing difficulties). The purpose of the present study is to estimate extend of swallowing difficulties in these participants post radiation treatment.

METERIALS AND METHODS

14 participants between the age range of 18 and 74years (Mean = 64.2) newly diagnosed with squamous cell carcinoma of head and neck, planned for radiation therapy at various hospitals in north Kerala and Mangalore was taken for the study. Participants with prior voice, swallowing difficulty and non-laryngeal cancers were excluded. The study was approved by institutional ethical board and written consent was obtained from all the participants prior the study. Manipal manual of swallowing abilities (MMSA), a tool to assess swallowing abilities was used to assess swallowing measures in these participants, once before the radiation treatment and once post treatment. Statistical analysis was performed using paired t-test with SPSS software package (SPSS, Inc., Chicago, IL).

RESULTS

Table 1: Pre and post treatment measures for all parameters of MMSA.

Parameter		Mean	Standard deviation	Pre Vs Post treatment	
				p value	t value
Sensory Assessment	Pre Treatment	6.7143	14.30285	.004*	-3.413
	Post Treatment	8.7143	15.81892		
Motor Assessment	Pre Treatment	18.2857	17.63249	.000*	-6.576
	Post Treatment	24.5714	16.79144		
Assessment of phases of Swallow	Pre Treatment	4.7143	7.84675	0.0*	-5.129
	Post Treatment	25.0	5.32291		
Total Score	Pre Treatment	29.7143	35.66845	.000*	-7.165
	Post Treatment	58.2857	32.73996		

*Significant difference ($p<0.05$)

On paired t-test, statistical significant difference was seen on all swallowing parameters in Manipal Manual of Swallowing abilities (MMSA). Significance was seen for Sensory assessment on pretreatment (M=6.7143, SD=14.30285) and post treatment (M=8.7143, SD=15.81892) conditons; t(14)= -3.413,p=.004; Motor assessment pretreatment (M=18.2857,SD=17.63249) and post treatment (M=24.5714,SD=16.79144) conditions t(14)= 6.576,p=.000; Assessment of phases of swallow as in pretreatment (M=4.7143,SD=7.84675) and post treatment (M=25.0, SD=5.32291) conditions t(14)= -5.129,p=0.0 and Total score on MMSA on pretreatment (M=29.7143,SD=35.66845) and post treatment (M=58.2857, SD=32.73996) conditions t(14)= -7.165, P=.000. All the post treatment measures as in sensory assessment, motor assessment, assessment of phases of swallow and total score on MMSA showed higher mean values compared to that of the pretreatment values.

DISCUSION

Results revealed significant difference in all the parameters of Manipal Manual of Swallowing Abilities (MMSA) on pretreatment vs post treatment measures. The significance in the respective parameters can be attributed to the following as mentioned below.

Orosensory skills refers to the ability of an individual to recognize or identify the sensations in the oral structures which has a direct implication towards deglutition. It is also referred to the ability of an individual to manipulate the articulators with respect to range, strength and speed of movement of articulators. The significance in orosensory skills can partly be due to pain during assessment procedure. Decreased sensory input at oral preparatory and oral pharyngeal phase as an effect of radiation is also observed [2]. Chemoradiotherapy is reported to affect recognition of taste in mouth.[3] Peresis of oral structures is yet another factor contributing for altered sensation.[4]

Results of Motor assessment would be due to restricted movements of the articulators, and pain while moving the articulators. Post radiotherapy effects on motor function related to swallowing has been discussed in literature over and again. Previous studies reports of decreased base of tongue to posterior wall contact and reduced pharyngeal contraction affecting bolus transport.[5] In addition decreased laryngeal elevation and penetration have also been reported. In addition, studies have reported lists of abnormalities observed in motor movements related to swallowing in post radiation patients.[6] Abnormalities in the oral preparatory and oral pharyngeal phase such as limitations in lip closure resulting in drooling; loss of cheek muscles resulting in pocketing of food in cheek; trismus impacting oral opening and bite range, tongue weakness or decreased tongue elevation and lateralization limiting positioning of the food bolus. Abnormalities in the pharyngeal phase were decreased motion and inversion, decreased tongue base retraction resulting in risk of aspiration, decreased contraction of pharyngeal constrictors[7] affecting transport of bolus through the pharynx, decreased laryngeal elevation, decreased anterior movement of larynx; and decreased cricopharyngeal opening which results in increased pharyngeal residue. Impairment of movement of structures involved in swallowing has been reiterated by other researchers also.[8]

Assessment of phases of swallowing involves the introduction of various feeds and observing for the swallowing parameters. The significance in post treatment as observed were related to cough while swallowing, post swallow gurgly voice, multiple swallows etc, which probably was due to oral phase impairment which would include reduced range of tongue movement, reduced tongue strength, impaired bolus formation, reduction in bolus transport in oral cavity, longer oral transit times, and increased food residue in oral cavity.[9] Pharyngeal phase swallow impairment can include restricted posterior movement of tongue base, impaired closure of velopharyngeal, and finally delayed triggering of the pharyngeal swallow restricting pharyngeal phase in them.[10] Reduction in hyoid and laryngeal movement, reduced laryngeal vestibule and inadequate glottic closure, and inadequate closure of upper esophageal sphincter can cause difficulties in bolus clearance and also aspiration in these individuals.[11] The lack of difference between pretreatment and one month post treatment could be

attributed to the recovery aspects. Studies have reported that the active effects of swallowing get resolved and return to baseline in post radiation patients.[12] In contrast, some researchers caution about late occurring swallowing impairment.[13]

Significance in Total MMSA score suggests that radiotherapy has an effect on swallowing parameters and the deviancies observed can be contributed to the all the statements above mentioned. This study can be taken up in a more precise manner by taking individuals of particular age range, classifying based on gender, radiation dose etc. This would aid further light to the knowledge of swallowing in these individuals and their management.

CONCLUSION

This study revealed that radiation therapy has a significant effect on swallowing measures of an individual undergoing radiation for nonlarynegal head and neck cancer. These impairments can be of negative impact on overall quality of life of the individual. Rehabilitation on this aspect can improve the quality of life in these individuals. Therefore it is necessary that, along with treatment of head and neck cancer, education of the patient with details of concurrent sequences during and after radiation therapy and management facilities available should be highlighted.

ACKNOWLEDGEMENT

Authors would like to thank Mangalore Academy Of Professional Studies for funding this research paper. Heartfelt gratitude to all staffs and students of Department of speech & hearing and Department of Radiology of nearby hospitals in Kerala and Mangalore for their support.

REFERENCES

1. Logemann JA, & Logemann JA. National Student Speech Language Hearing Association. *Evaluation and treatment of swallowing disorders*, 1983; 38-50.
2. Pauloski BR. Rehabilitation of dysphagia following head and neck cancer. *Physical medicine and rehabilitation clinics of North America*, 2008; *19*(4): 889-928.
3. Rosenthal DI, Trotti A. Strategies for managing radiation-induced mucositis in head and neck cancer. In *Seminars in radiation oncology*, 2009; 19(1): 29-34.
4. Logemann JA, Rademaker AW, Pauloski BR, Lazarus CL, Mittal BB, Brockstein B, Liu D. Site of disease and treatment protocol as correlates of swallowing function in patients with head and neck cancer treated with chemoradiation. *Head & neck*, 2006; 28(1): 64-73.
5. Kotz T, Costello R, Li, Y, Posner MR. Swallowing dysfunction after chemoradiation for advanced squamous cell carcinoma of the head and neck. *Head Neck*, 2004; *26:* 365-372.
6. Murphy, Barbara A, Gilbert J. Dysphagia in head and neck cancer patients treated with radiation: assessment, sequelae, and rehabilitation. In *Seminars in radiation oncology*, 2009; 19(1): WB Saunders.
7. Pauloski BR, Rademaker AW, Logemann J A. Relationship between swallow motility disorders on videofluorography and oral intake in patients treated for head and neck cancer with radiotherapy with or without chemotherapy. *Head Neck*, 2006; *28:* 1069–1076.
8. Kotz T, Costello RLi Y, Posner MR. Swallowing dysfunction after chemoradiation for advanced squamous cell carcinoma of the head and neck. *Head Neck*, 2004: 365-372.
9. Logemann JA, Pauloski BR, Rademaker AW. Swallowing disorders in the first year after radiation and chemo radiation. *Head Neck*, 2008; 30: 148–158.
10. Carrara-de Angelis E, Feher O, Barros APB, Nishimoto IN, Kowalski LP. Voice and swallowing in patients enrolled in a larynx preservation trial. *Archives of Otolaryngology–Head & Neck Surgery*, 2003; 129(7): 733-738.
11. Pizzorni N, Ginocchio D, Mozzanica F, Roncoroni L, Scarponi L, Schindler A. Head and Neck Diseases and Disorders Causing Oropharyngeal Dysphagia. *Journal of Gastroenterology and Hepatology Research*, 2014; *3*(10).
12. Isitt J, Murphy B, Beaumont JL, Garden AS, Gwede CK, Trotti A, Brizel DM etal. Oral mucositis (OM) related morbidity and resource utilization is a prospective study of head and neck cancer (HNC) patients. Journal of Clinical Oncology, 2006; 24(18S): 5539.
13. Eisbruch A, Schwartz M, Rasch, C. Dysphagia and aspiration after chemoradiotherapy for head-and neck cancer: which anatomic structures are affected and can they be spared by IMRT? *International Journal of Radiation Oncology Biology Physics*, 2004; *60*: 1425–1439.