ORIGINAL RESEARCH PAPER

Volume-7 | Issue-5 | May-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ORAL CAVITY COMPLICATIONS RELATED TO SALIVARY GLANDS IN DIFFERENTIATED THYROID CANCER PATIENTS AFTER RADIOACTIVE IODINE 131 THERAPY AT AN INTERVAL OF 3 MONTHS AND 1 YEAR

Nuclear Medicine

Yadav Naveen* Senior Resident Nuclear Medicine AIIMS, Jodhpur, Rajasthan, India *Corresponding Author

Rather Tanveer Ahmad Associate Professor, SKIMS,Srinagar, J&K, India

Khan Shoukat H Professor, SKIMS,Srinagar, J&K, India

ABSTRACT

Abstract: Salivary glands are the most commonly affected organ after radioactive iodine(RAI) 131 treatment used for differentiated thyroid cancer (DTC). Symptoms may develop immediately after the therapeutic dose or months later in patients treated with radioactive I 131 in DTC. The frequently encountered complications include radiation sialadenitis, taste alterations, infections, dental caries, transient facial nerve palsy and xerostomia which can cause distress to the patient.

Material &Methods: This was a prospective comparative study conducted in the Department of Nuclear Medicine in Sher -I- Kashmir Institute of Medical, Srinagar. Study comprises of 20 patients of DTC who underwent baseline clinical assessment before Surgery and after RAI therapy at 3 months and at 1 year. All patients underwent baseline USG to rule out any salivary gland disorder.

Results: Out of 20 patients, 14 were female and 6 were male. At 3 months after RAI therapy 9 patients (45%) develops complications which get resolved at 1 year. One patient develops fresh dental caries at 1 year of presentation.

Conclusion: In our study dryness of mouth and dental caries were the most frequent complications after the first dose of iodine131 therapy at 3 months and all patients improved clinically at 1 year of follow up. One new patient develops dental caries after 3 months. A large multi centric and longer duration follow up study would be helpful for further evaluation.

KEYWORDS

Radioactive Iodine, Differentiated Thyroid Cancer, Sialadenitis, Xerostomia

INTRODUCTION

Main salivary glands are parotid, submandibular and sublingual glands.[1]. Parotid glands are the largest salivary glands and constitutes about 15-20% of the total saliva which is mainly serous in nature whereas submandibular glands are smaller in size than parotid glands but produce 70-75% of the saliva which is both serous and mucinous in nature. Sublingual glands produce 5% of the total saliva which is mainly mucinous in nature[1]. About average 1000ml of saliva is secreted daily by all the salivary glands. Saliva contains 2 major types of protein secretions, serous secretion which contains ptylin, an alpha amylase enzyme which helps in digestion of starch and mucus secretions containing mucin for lubricating food. Saliva also contains antimicrobial factors like lysozyme, lactoperoxidase, secretory IgA which helps in killing the bacteria[2]. All salivary glands are susceptible to damage but the glands containing serous cells are more susceptible to the deleterious effect of irradiations than the mucous acini[3].

Therefore the serous cells containing parotid glands demonstrate more intense radiation sialadenitis than the mixed Submandibular glands[4]. The principal site of iodide transport into saliva is the epithelium of the parotid gland's intralobular ducts[3]. Iodide is extracted from periductal capillaries and concentrated by the ductal epithelium, where upon it is secreted into the duct lumen and transported into the oral cavity.

It has been calculated that up to 24% of the administered I 131 dose for thyroid cancer therapy is lost in the saliva[5]. Dose related damage to salivary parenchyma may occur and symptoms may develop immediately after the therapeutic dose or months later and can progress in intensity with time[6]. Radiation damage to the salivary glands is a known short-term and long-term complication of radiation therapy for patients treated with radioactive I 131 in differentiated thyroid cancer management[7,8].

The frequently encountered complications include radiation sialadenitis, taste alterations, infections, dental caries, candidiasis, facial nerve palsy, xerostomia[6]. Sialadenitis is the most frequent complication of I 131 therapy for thyroid cancer. Usually first gland symptom that occurs post radioiodine 131 therapy is obstructive in nature[6]. Almost immediately after I 131 therapy, transient swelling and pain with decreased salivary flow is a known complaint and is usually bilateral and involving the parotid glands[7,8].

Narrowing of the duct lumen from radiation induced inflammation causes the formation of jelly like plug causing obstruction with stagnation and mucus precipitation. This results in salivary retention and adds to the swelling and pain which is more marked during eating[9]. Effect is rapid and dose related and within few days resolution of post therapeutic inflammatory process occurs and symptoms subside[10]. Transient taste alterations after I131 therapy in DTC develop with the temporary parotid symptomatology and may last for several weeks. Distorted taste perception has been reported in 16% of the patients who received 150 mCi I 131[11] and 27% of those who received 200 mCi I 131[12] and may last several weeks. The alteration in taste is due the effect of radiation on von Ebner's serous glands that are situated in immediate vicinity of the taste bud containing circumvallate papilla[6].

With higher therapeutic doses of I 131, the loss of taste can occasionally become permanent. Patients may also develop transient facial paralysis after I 131therapy because of the inflammatory process associated with sialadenitis which can secondarily involves the facial nerve as it passes through the parotid glands. After the remission of the acute inflammation, the facial nerve palsy resolves [13]. Reduced salivary flow rate following high dose I131 therapy can lead to oral candidiasis[14]. Since radiation is a known carcinogenic agent, I 131 can also lead to salivary neoplasms like pleomorphic adenoma, mucoepidermoid carcinoma [15]. Various imaging modalities like plain X ray, ultrasound, sialography, CT, MRI and salivary gland scintigraphy can also be used for the detection of salivary gland disorders[16].

Material and methods: This was a prospective comparative study conducted in the Department of Nuclear Medicine in Sher -I- Kashmir Institute of Medical, Srinagar. Aim of the study was to clinically assess the salivary gland related oral cavity complications mainly salivary glands in patients of DTC post iodine 131 therapy at 3 month and 1 year follow up. Study comprised of patients who were diagnosed as cases of differentiated carcinoma thyroid and treated with radioactive I

131.

Patients having history of salivary gland disorders like obstruction, inflammation, infection, tumor, trauma, previous radiation therapy to head and neck, systemic diseases like Sarcoidosis, Sjogren's Syndrome, Parkinsonism, Cystic Fibrosis, Diabetes Mellitus, recent intake of drugs like anticholinergics, antidepressants, antihistaminics and Pregnant and lactating women were excluded from the study. Patients were examine clinically for the complaints at 3 months and at 1 year after Iodine 131 therapy.

Before RAI therapy patients USG of the patients were done to rule out any salivary gland disorders. Vrious questions like swelling of salivary glands (Sialadenitis), dryness of mouth (Xerostomia), difficulty in swallowing, taste alteration, dental caries were asked.

RESULTS AND OBSERVATIONS:

Table 1: Case Distribution

SEX	CASES
Females	14
Males	6

Fig.1: Case distribution

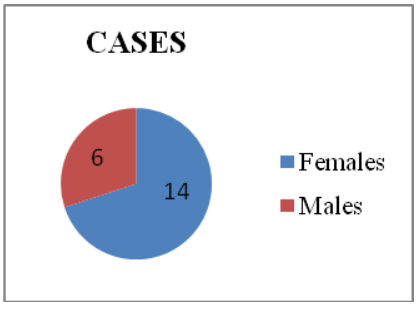


Table 2: Post RAI Therapy oral cavity complications at 3 months

Patients	Complications	No Complications
20	9	11

Fig.2: Out of 20 Patients 9 patients (45%) developed salivary glands related complications at 3 months after therapy while11 (55%) patients did not develop any complication.

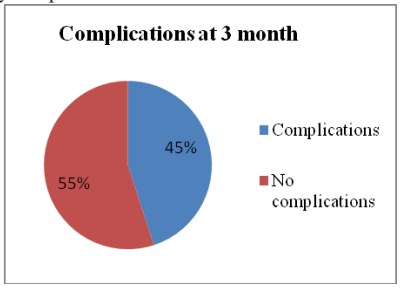
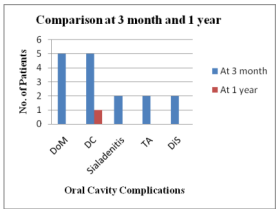


Table 3: Comparison of oral cavity complications after Radioiodine Therapy at 3 months and at 1 year

Complications	At 3 month	At 1 year
Dryness of mouth	5	0
Dental Caries	5	1
Sialadenitis	2	0
Taste Alteration	2	0
Difficultyinswallowing	2	0

Fig.3: Comparison at 3 months and 1 year



Comparison of salivary gland related complications at 3 month and at 1 year after radioiodine therapy. Most common complication were DoM(dryness of mouth) (25%) and DC(dental caries) (25%) followed by Sialadenitis (10%), TA(taste alteration) (10%) and DiS (difficulty in swallowing) (10%) at 3 months. At 1 year all symptoms resolved. 1 new patient developed dental caries at 1year.

DISCUSSION:

Radioactive I 131 therapy is an effective treatment for differentiated thyroid cancer (DTC) but it may also cause damage to the salivary glands resulting in their dysfunction. Sodium iodide symporter present in thyroid gland is also expressed in salivary gland, stomach and breast tissue through which iodine 131 is taken up by the cells[17]. In the process of treatment of differentiated thyroid cancer with radioactive I 131, salivary glands are exposed to the damaging effects of irradiations after administration in therapeutic doses[6,7,18]. The frequently encountered complications include radiation sialadenitis, taste alterations, infections, dental caries, candidiasis, facial nerve palsy, xerostomia and neoplasia[19]. These complications can cause distress and decrease the quality of life[19].

Before starting, ethical clearance for the study had been taken from the ethical committee of SKIMS. Study included 20 patients. All patients underwent baseline USG neck to rule out anatomical abnormality of the salivary glands. Out of 20 patients, 14 (70%) were female and 6 (30%) were male (Table.1, Fig 1). Mean age of the patients was 37.5±13.4 (range: 20-60 year). All the patients underwent evaluation by history and clinical examination at 3 months and 1 year after I131 therapy. Mean dose of radioactive Iodine131 administered to the patients was 100 mci (range from 72 -116) and median dose was also 100 mci. Lemon juice as a sialogogue was started within 1 hour of high dose therapy. Patients were advised to increase the intake of fluids post I 131administration. 9 out of 20 patients (45%) develops oral cavity complications at 3 moths (Table 2; Fig.2). At 1 year all the complications were resolved but 1 new patient develops dental caries after 3 months. Comparison of complications at 3 month and at 1 year are shown in Table 3, Fig;3.

Our results at 3 months about complications of salivary glands are similar to the study performed by Armaghan Fard-Esfahani et al[20] on 27 patients of differentiated thyroid cancer treated with radioiodine 131 therapy(100mci) which had shown that 49.1% patients in their study developed side effects.

Early start of lemon candy or juice as a sialogogue decreases the side effects because of decrease in the radiation dose absorbed by the salivary glands as shown by studies of Kulkarni and coworkers[21] and Von Nostrand et al[22].

However Nakada K et al[23] performed a comparative study and found that early start of sucking lemon candy may induce a significant increase in salivary gland damage because of increased absorbed dose and according to them lemon candy should not be given until 24 h after radioiodine therapy which is contradictory to our findings. Most common complication is dryness of mouth (25%) and dental caries (25%) at 3 months in our study which is also shown by the study performed by Anna Clara Fontes Vieira et al[24] of radioactive treatment in differentiated thyroid cancer patients. Acute sialadenitis was present in 2 patients (10%) after therapy which is nearly similar to the Allweiss et al[11] study in which 12% patients develops sialadenitis after radioiodine therapy.

In our study all the complaints at 3 months were resolved at 1 year except that one new patient develops complaint of dental caries at 1 year of presentation.

Conclusion: Salivary glands are most commonly affected after the radioiodine therapy for differentiated thyroid cancer. Oral cavity complications affect the quality of life. In our study Comparison of salivary gland related complications at 3 month and at 1 year after radioiodine therapy. Most common complication were DoM(dryness of mouth) (25%) and DC(dental caries) (25%) followed by Sialadenitis (10%), TA(taste alteration) (10%) and DiS (difficulty in swallowing) (10%) at 3 months. At 1 year all symptoms resolved. 1 new patient developed dental caries at 1year. of follow up. One new

patient develops dental caries after 3 months. A large multi centric and longer duration follow up study would be helpful for the better evaluation.

Conflict of interest: None.

References:

1. Guyton and Hall Textbook OF Medical physiology. 11th ed. An imprint of Elsevier saunders. John F. Kennedy. Blvd Suite 1800, Philadelphia, Pennsylvania, c2005; p.793-795.
2. Fauci et al. Harrison's Principles of internal medicine, 17th ed. Mc Grew-Hill companies Inc. c2008;vol.1: p. 220.
3. Gates GA, Work WP. Radioisotope scanning of the salivary glands. Laryngoscope 1967;77:861-875.
4. Mason DK, Harden R McG, Alexander WD. The salivary and thyroid glands: A comparative study in man. Br Dent J 1967;122:485-489.
5. McCall MS, Timm, L, Frenkel EP. Chewing tobacco and radioiodine [letter]. Lancet 1967;1:902.
6. Susan J Mandel, Louis Mandel. Radioactive iodine and salivary gland. Thyroid 2003;13(3):265-271.
7. Van Nostrand D. Sialoadenitis secondary to 131I therapy for well-differentiated thyroid cancer. Oral Dis. 2011;17:154-61.
8. Freitas JE, Gross MD, Ripley S, Shapiro B. Radionuclide diagnosis and therapy of thyroid cancer: current status report. Semin Nucl Med 1985;15:106-131.
9. Allweiss P, Braunstein GD, Katz A, Waxman A. Sialadenitis following I-131 therapy for thyroid carcinoma: Concise communication. J Nucl Med 1984;25:755-758.
10. Khan S, Waxman L, Ramanna G, Ashok N, Nagaraj G, Braunstein G. Transient radiation effects following high-dose I-131 therapy for differentiated thyroid cancer [Abstract]. J Nucl Med 1994;35 Suppl:p.15.
11. Alexander C, Bader JB, Schaefer A, Finke C, Kirsh CM. Intermediate and long-term side effects of high-dose radioiodine therapy for thyroid carcinoma. J Nucl Med 1998;39(9):1551-1554.
12. Brown AP, Greening WP, McCready VR, Shaw HJ, Harmer CL. Radioiodine treatment of metastatic thyroid carcinoma: The Royal Marsden Hospital experience. Br J Radiol 1984;57:323-327.
13. Levenson D, Coulec S, Sonnenberg M, Lai E, Goldsmith SJ, Larson SM. Peripheral facial nerve palsy after high-dose radioiodine therapy in patients with papillary thyroid carcinoma. Ann Int Med 1994;120:576-578.
14. Bushell DL, Boles MA, Kaufman GE, Wadas MA, Barnes WE. Complications, sequela and dosimetry of iodine-131 therapy for thyroid carcinoma. J Nucl Med 1992;33:2214-2221.
15. Edmond CJ, Smith T. The long term hazards of treatment of thyroid cancer with radioiodine. Br J Radiol 1986;59:45-51.
16. Klutmann S, Bohuslavizki KH, Kroger S, Bleckmann C, Brenner W, Mester J, et al. Quantitative salivary gland scintigraphy. J Nucl Med Technol 1999;27:20–26.
17. Ward LS, Assumpção LV. Thyroid cancer: prognostic factors and treatment. Arq Bras Endocrinol Metabol. 2004; 48:126-36.
18. Dohan O, De la Vieja A, Paroder V, Riedel C, Artani M, Reed M et al.. The sodium/iodide symporter (NIS): characterization, regulation and medical significance. Endocr Rev. 2003 Feb; 24(1):48-77.
19. Almeida JP, Vartanian JG, Kowalski LP. Clinical predictors of quality of life in patients with initial differentiated thyroid cancers. Arch Otolaryngol Head Neck Surg. 2009 Apr;135(4):342-6.
20. Armaghan Fard-Esfahani, Babak Fallahi, Mohammad Karimi, Davood Beiki, Mohsen Saghari, Alireza Emami-Ardekani et al. Changes in salivary gland function following radioiodine therapy of thyroid diseases: A comparison of high-dose therapy for thyroid cancer and low-dose therapy for benign thyroid disease. Iran J Nucl Med 2015;23(1):1-7.
21. Kulkarni K, Van Nostrand D, Atkins F, Mete M, Wexler J, Wartofsky L. Does lemon juice increase radioiodine reaccumulation within the parotid glands more than if lemon juice is not administered? Nucl Med Commun. 2014;35(2):210-6.
22. Van Nostrand D, Bandaru V, Chennupati S, Wexler J, Kulkarni K, Atkins F et al. Radiopharmacokinetics of radioiodine in the parotid glands after the administration of lemon juice. Thyroid. 2010 Oct;20(10):1113-9.
23. Nakada K, Ishibashi T, Takei T, Hirata K, Shinohara K, Katoh S et al. Does lemon candy decrease salivary gland damage after radioiodine therapy for thyroid cancer? J Nucl Med. 2005 Feb;46(2):261-6.
24. Anna Clara Fontes Vieira, Aline Sampaio Lima Rodrigues, Maria Carmen Fontoura Nogueira da Cruz, Fernanda Ferreira Lopes. Profile of salivary gland flow dysfunctions in patients with differentiated thyroid carcinoma submitted to radioiodine therapy Braz. J. Oral Sci. July/Sept. 2013;vol.12:no.3. Available from: http://dx.doi.org/10.1590/S1677-32252013000300004.