



RADIOIODINE THERAPY IN MANAGEMENT OF THYROID CARCINOMA — A REVIEW OF 138 PATIENTS

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Abstract. Differentiated thyroid carcinomas are being treated by using a widely accepted protocol of surgery and radioiodine therapy followed by supplementation of thyroid hormones in the Nuclear Medicine Centre (NMC), Dhaka Medical College Hospital (DMCH) since 1990. In the present study 138 patients (Male-54, Female-84) with differentiated thyroid cancers received radioiodine therapy for ablation of residual thyroid tissue with a dose of 2.77–3.7 GBq (75–100 mCi), for lymph node metastases 5.55–6.5 GBq (150–175 mCi), for lung metastases 5.55 GBq (150 mCi) and for bony metastases 7.4 GBq (200 mCi). Among 138 patients papillary carcinoma was observed in 94 cases (68%; Male-42, Female-52), follicular type was found in 30 cases (22%; Male-8, Female-22) and mixed type in 14 patients (10%, Male-4, Female-10). Single dose of 2.77–3.7 GBq (75–100 mCi) of radioiodine was received by all 138 patients. Among the unablated patients 62 received double doses totalling 9.25 GBq (250 mCi), 44 received three doses 12.95 GBq (350 mCi) and one patient received 8 doses 33.3 GBq (900 mCi). Out of 138 patients single dose ablated 76 cases and 62 remain unablated. Multiple doses ablated 28 patients and 34 still remain unablated and is under follow up. The success and failure in management of patients with differentiated thyroid cancer over 8 years period have been discussed here revealing a satisfactory outcome.

1. INTRODUCTION

Thyroid cancer is the commonest endocrine malignancy, yet management remains controversial [1]. Physicians have long differed over the extent of initial surgical resection, over the proper use of adjuvant radioiodine to ablate residual thyroid remnants and over the best method of treating the recurrent disease. Much of this controversy stems from the long life expectancy associated with differentiated thyroid carcinoma, its low incidence in most population, and its frustrating tendency to recur often even many years after the initial therapy. Thus the efficacy of any management protocol can be justified only after a large number of patients have been treated and after long follow-up periods which could provide sound statistical basis for comparisons [2].

In spite of this sparked controversy, differentiated thyroid carcinomas are being treated by using a widely accepted protocol of surgery and radioiodine therapy followed by supplementation of thyroid hormones. The efficacy of this approach has been well documented. In the Nuclear Medicine Centre of Dhaka Medical College Hospital, this method has been successfully practiced in collaboration with surgeons and is being considered a major part of the management of differentiated thyroid carcinoma since 1990.

The avidity of differentiated thyroid carcinoma for iodine is the basis for the use of radioiodine [3] both for the detection and treatment in primary, recurrent and metastatic tumour.

This retrospective review was performed to evaluate the effectiveness of radioiodine in the ablation of residual thyroid tissue after surgery in differentiated thyroid cancer, metastases and recurrence of disease.

2. MATERIAL AND METHODS

In the present study a total of one hundred & thirty eight patients (Male-54, Female-84) were reviewed. Some of these patients were reported to NMC, Dhaka in presurgical state for initial diagnosis and they were evaluated by Ultrasonography, in vivo and in vitro nuclear medicine

techniques and final diagnosis was documented by histopathology during or after operation. In most cases a total or near total thyroidectomy was performed at the time of 1st operation or as a 2nd procedure. Following the total thyroidectomy, a period of 4 weeks was allowed to elapse to permit serum TSH to rise, before a large dose scan was performed using oral administration of I^{131} , dose 111–185 MBq (3–5 mCi) 72 hours later using rectilinear scanner [4].

Patients subjected to post operative evaluation by I^{131} scanning for residual thyroid mass and metastases, were initially administered with 3.7 MBq (100 μ Ci) of I^{131} orally for screening at 24 hours. Specially in cases of hemithyroidectomy or lobectomy it has been observed that significant amount of residual thyroid tissue remained intact and in these cases I^{131} ablation therapy was initiated immediately [5] with an average dose of 2.77–3.7 GBq (75–100mCi).

In our protocol a first ablation dose for residual thyroid tissue of 2.77–3.7 GBq (75–100 mCi) is generally used although most clinicians prefer a fixed dose of 3.7–7.4GBq (100–200 mCi) [6–9]. Patients are usually admitted into a designated room with ensuite bathroom facilities; visiting time being restricted to not more than 10 minutes a day. Daily monitoring was done until the patient was discharged with radiation levels acceptable under national regulation.

In cases of evaluation of recurrences and metastases, patients taking thyroxine undergo a minimum of 4 weeks withdrawal of treatment and in cases of T_3 , a 2 week cessation of therapy was followed before large dose scan was done. In cases of cervical node metastases 5.55–6.5 GBq (150–175 mCi) was applied. In lung metastases 5.55 GBq(150 mCi) and in bony metastases average 7.4 GBq (200 mCi) doses were given.

In subsequent follow ups patients were evaluated clinically, biochemically, by I^{131} large dose scan and serum thyroglobulin estimation. Follow up was usually performed at six monthly or yearly intervals with repeated I^{131} therapy until tumour ablation was attained.

3. RESULTS

The results of radioiodine treatment for differentiated thyroid carcinoma in the present study are presented here.

Total study population included 138 patients, age ranging from 15–65 years (mean 33.7 years). Occurrence of the disease was common in 30–40 years age group. Number of reported patients were gradually increasing as represented by histogram (Figure 1).

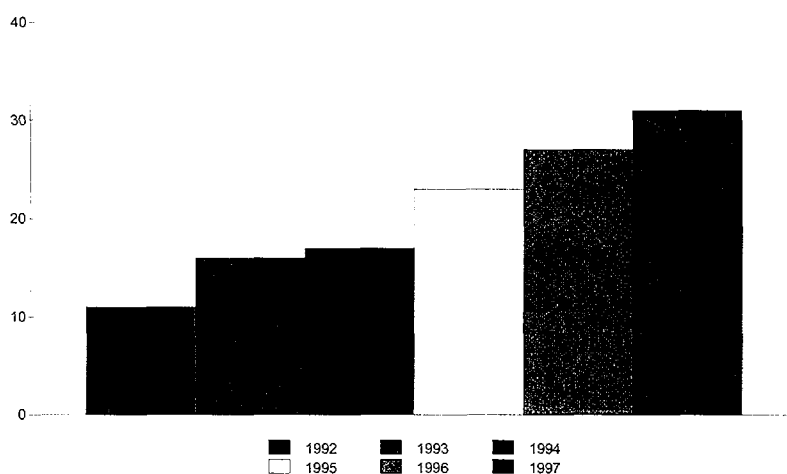


FIG. 1. Graphical presentation of patients accumulation.

In sex distribution along with the histopathological variety of thyroid cancer it was observed that female patients were predominant, female 84 (60.86%) and male-54 (39.14%). Common variety was observed to be papillary type, 94 (68%), follicular type was 30 (22%) and mixed variety was found in 14 cases (10%). (Table I).

TABLE I. TYPE OF CANCER WITH SEX DISTRIBUTION

TYPE OF PATIENT	MALE	FEMALE	TOTAL	PERCENTAGE
PAPILLARY	42	52	94	68%
FOLLICULAR	08	22	30	22%
FOLLICULAR VARIANT OF PAPILLARY (MIXED)	04	19	14	10%
TOTAL =	54	84	138	

Out of 138 patients, total thyroidectomy was done in 18 cases (13.04%), near total thyroidectomy in 34 cases (24.6%), hemithyroidectomy in 38 cases (27.5%), sub total thyroidectomy in 4 cases (2.8%) and extended thyroidectomy in 10 cases (7.24%). In case of extended thyroidectomy all 10 patients needed single dose of radioiodine while all 4 cases of sub total thyroidectomy required multiple doses. Among the hemithyroidectomy group all 36 patients needed multiple doses of radioiodine and only 2 cases received single dose. 14 cases of total thyroidectomy needed single dose while 4 needed multiple doses. In case of near total thyroidectomy 26 patients were given single dose of radioiodine while only 8 patients were applied multiple doses (Table II).

TABLE II. TYPES OF SURGERY AND DOSE NEEDED FOR ABLATION

Number of doses	Total thyroidectomy	Near total thyroidectomy	Hemi-thyroidectomy	Sub-total thyroidectomy	Extended thyroidectomy
Single	14	26	02	0	10
Multiple	4	8	36	4	0

All 138 patients initially received single dose of I^{131} 2.7–3.7 GBq (75–100mCi) consequently 62 received two doses 9.25 GBq (250 mCi), 44 received three doses–12.95 GBq (350 mCi) and only one patient received exceptionally large number of dose, 33.3 GBq (900 mCi). Regarding ablative treatment it has been observed that single dose in 138 cases yielded complete ablation in 76 (55%) cases while 62 (45%) remained unablated. All unablated patients were given multiple doses and finally 28(20%) more patients were ablated and 34(25%) are still unablated and are under follow up. (Table III)

TABLE III. OUTCOME OF 138 THYROID CARCINOMA PATIENTS RECEIVING RADIOIODINE THERAPY FOR ABLATION

No. of Dose	No. of cases	Ablated	Unablated	Total Dose
One	138	76	62	2.77–3.7 GBq
Two	62	18	44	9.25 GBq
Three	44	10	34	12.95 GBq
More than three	1	-	1	33.3 GBq

In table IV variety of metastases were depicted. Commonest type of metastases was observed in lymph nodes, next common type is bony metastases followed by lung and surrounding fibrofatty tissue respectively.

In table V side effects after radioiodine therapy were described. All these complications were temporary i.e. short term effects. No long term effect was observed in any of the patients.

TABLE IV. TYPE AND NUMBER OF METASTASES

TOTAL NO. OF CASES	TYPE OF METASTES	NUMBER OF CASES
138	Lymph node metastasis	69 (80.23%)
	Bone metastases	09 (10.47%)
	Lung metastases	04 (4.65%)
	Infiltration into surrounding fibro fatty tissue	04 (4.65%)
		Total No. of metastases-86

TABLE V. SIDE EFFECTS OBSERVED AFTER RADIOIODINE THERAPY AMONG STUDY POPULATION

SHORT TERM		
COMMON		RARE
Nausea		Sialadenitis
Vomiting		Transient bone marrow depression
Gastritis		Vocal cord paralysis
Acute Radiation Sickness:		
a) Fatigue		
b) Headache		
Radiation Thyroiditis		
LONG TERM COMPLICATION — NOT OBSERVED		

4. DISCUSSION

The term cancer induces an apparent fear in the affected patients as fate of many of the cancers are still a matter of despair. Although thyroid cancer constitutes <1% of all cancers, differentiated thyroid cancer covers 80% of all the cancers of thyroid and if managed properly yields an excellent result [10]. In the sense of outcome of the treatment of cancerous patients, differentiated thyroid cancer has emerged as one of the cancers having better prognosis and there is almost no threat to longevity.

In the past, this form of cancers were being treated by surgery and/or thyroid hormone administration for TSH suppression [11]. Following surgical removal of the tumour with a total thyroidectomy and extirpation of any evident nodal disease, radioiodine proved its major role in achieving a complete cure [12, 13]. Despite many confusions, an internationally accepted protocol regarding the management of these cases has been established.

In our study patient accumulation is gradually increasing every year which indicates awareness of the patients about the disease and more acceptance of radioiodine therapy by the referring physicians.

Adequate surgical debulking of the thyroid and removal of nodes, if any, is a primary requisite for radioiodine therapy. In cases of recurrence localized to the neck, the use of surgery before radioiodine therapy should be considered to debulk the tumour and optimize the efficacy of radioiodine. The combination of surgery and radioiodine has a better outcome than the use of surgery alone [14]. In our study it is evidenced that amount of radioiodine required for thyroid cancer therapy is inversely related to the removal of thyroid gland.

Papillary type of thyroid cancer is most common in our population, which is in good agreement with the literature [15]. Lymph node metastases is the commonest type in our study which is well correlated with papillary predominance. Among the post radiation complications short term side effects are only found instead of any long term complications. Surely the duration of follow up is not enough to comment about the long term complications.

In our centre one patient with medullary carcinoma was applied radioiodine therapy after surgery recognized that these tumours themselves do not take up radioiodine, the rationale for this is the multicentricity of the tumours in patient with familial form of the disease [15]. Six months after the therapy the patient's condition is still uneventful except for high serum calcium level and without any evidence of metastases.

Two patients with differentiated thyroid carcinoma got external beam radiation, one had extensive neck nodes involvement and the other had involvement of the shoulder joint with a big swelling. No significant improvement of disease was observed after beam therapy. In our centre this method of radiation is not encouraged as supported by literature [16].

I^{131} radioiodine remains the most frequently used form of radionuclide therapy with its clearly defined role in both benign and malignant conditions, 40 years experience of its use has been shown to be safe, effective, cheap and the theoretical risks of tumour induction and chromosomal damage have not been demonstrated in practice. Many of the lessons learnt from the experience with I^{131} radioiodine are now proving useful as new radioiodine therapies are developed and integrated into routine management. An essential part in achieving this success is the patients good appraisal of the steps of the treatment. Instead of general cancer phobia, well acceptance to this treatment and undergoing regular follow up can provide patients with well differentiated thyroid cancer an almost normal and active life. Further to this it is worthwhile to state that with persistent modern surgery and I^{131} therapy rarely should a patient die of well differentiated thyroid carcinoma [17].

This study identifies several short comings from what the optimum management of thyroid cancer might be considered. In practice a good interdisciplinary communication between surgeons and nuclear medicine specialists and a locally agreed and implemented protocol will improve the care of thyroid cancer patients.

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