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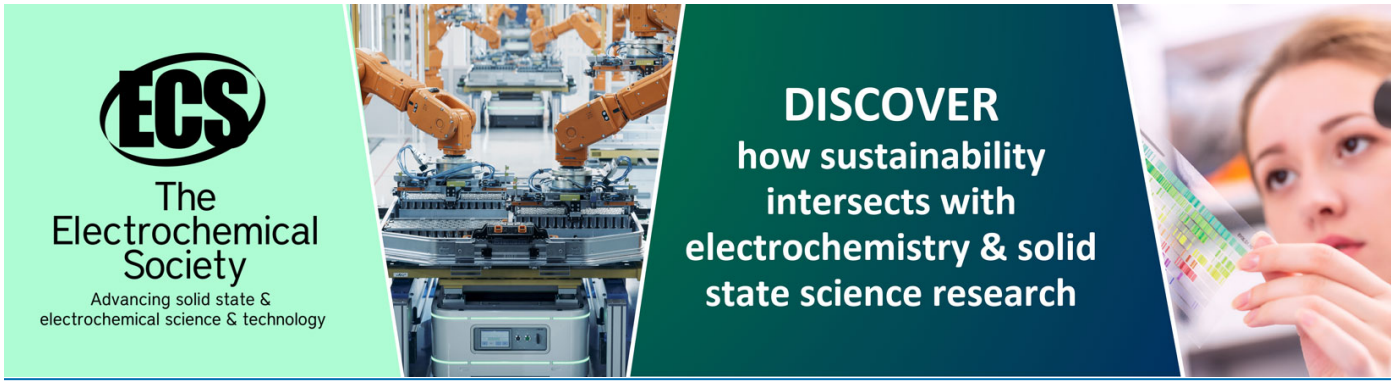

Survival outcome of radioiodine therapy in post thyroidectomy thyroid carcinoma patients: Outcome of long term follow up

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Abstract. The overall prognosis of patients with thyroid carcinoma is excellent whenever managed following best practice guidelines. Objective: To calculate sex and age group affected by thyroid cancer; to compare between single or multiple dose of radio ablation needed after thyroidectomy and to determine the percentage of patients become disease free during their follow up. Methods: This was a retrospective study done in NINMAS, Bangladesh on 687 patients from 1984 to 2004. In all cases total or near total thyroidectomy was done before commencing radioiodine therapy. Patients TG level, neck ultrasonography, thyroid scan, whole body I^{131} scans, neck examination were done every six monthly/yearly. Results: Among 687 patients, female were more sufferers (68.1%) and female to male ratio was 2:1. Age group 19-40 years was mostly affected (57.8%). Most common type seen was papillary carcinoma (81.8%). After ablation 100 patients did not follow-up. Total 237 patients discontinued within 4 years. Remaining 450 patients undergone regular follow-up for 5 years and more, 394 were disease free (87.6%). Total recurrence of metastasis was 23 and 12 patients expired at different times. Conclusions: Long-term regular follow-up is necessary after radioiodine ablation to become free of disease.

1. Introduction

Differentiated thyroid cancer (DTC) accounts for 98% of thyroid cancer, with neoplasms arising from the follicular cells (papillary, follicular and Hurthle cell thyroid cancer) and parafollicular cells (medullary thyroid cancer). Thyroid cancer is the most common endocrine malignancy [1]. Management of DTC includes total or near total thyroidectomy followed by radio-iodine ablation. Ablation is given to destroy the remnant thyroid tissue as well as residual cancer tissue. Ablation facilitates follow-up of these patients by whole body I^{131} scan and estimation of serum TG level. Long term follow-up is necessary after radio-ablation to detect early relapse and distant metastasis as well as evaluate the effectiveness of TSH suppression [2]. DTC is slowly growing cancer and good prognosis with appropriate management including radio iodine ablation after total / near total thyroidectomy and thyroid hormone suppression [1, 2, 6]. Radioactive Iodine (RAI) is administered as adjuvant therapy to reduce risk of recurrence and to facilitate future cancer surveillance. RAI ablation should be completed within 4-6 weeks of thyroidectomy [3, 4].

The aim of this study was to calculate the sex and age group mostly affected by thyroid cancer; to compare between single and multiple dose of radio ablation needed after thyroidectomy and to determine the percentage of carcinoma patients become disease free apparently during their follow-up.

2. Method

This study was a retrospective study done in National Institute of Nuclear Medicine and Allied Sciences (NINMAS), Bangladesh reviewing the medical records of the 687 DTC patients over the 21-year period from 1984 to 2004. Data on patients' status at half-yearly / yearly follow-up was collected and included those patients who received radio-active iodine and then lost without any follow-up, those who continued for follow-up for one to twenty-eight years till 2015. The patients' data contained age at diagnosis, gender, carcinoma types, state of metastasis at diagnosis, number and type of surgery, therapy details (1st dose, number of doses, total doses), duration of follow-up and their conditions at last follow-up on individual basis. We analyzed the data using SPSS version 19.1.

3. Results

Figure 1 shows the distribution of the 687 patients by their year of registration in NINMAS. It was found that only 3 patients registered for therapy in 1984-85 and only 7 patients in 1986-90. Then number of patients increased gradually in the successive years up to 2004.

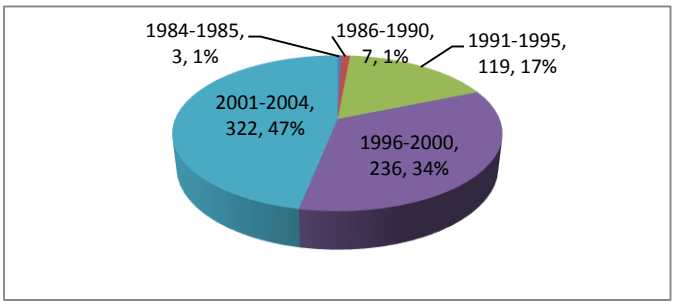

Figure 1. Distribution of the patients by their year of registration in NINMAS

Figure 2 shows the distribution of the patients by their age. Among the total of 687 patients, 468 (68.12%) were female and 219 (31.88%) were male resulting in a female to male ratio almost 2:1. Patients mostly affected were 397 (57.8%), at the age group of 19-40 years. Only 52 patients (7.5%) were children and adolescents (belong to 1-18 years) and only 43 (6.2%) patients from elderly group (belong to 61-94 years).

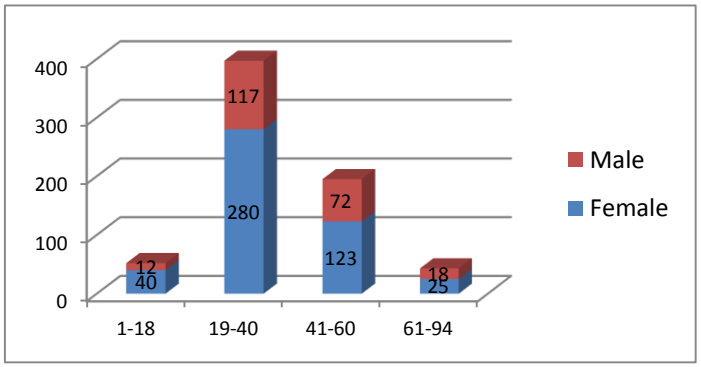

Figure 2. Distribution of the patients by their age and gender.

Table 1. Distribution of the patients by the type of their carcinoma.

Carcinoma type	Frequency	Percentage
Papillary Thyroid Carcinoma (PTC)	563	81.80
Follicular Thyroid Carcinoma (FTC)	108	15.72
Others	16	2.48

Table 1 shows the distribution of the patients by the type of their carcinoma. Of the 687 patients with DTC, 563 (81.80%) had papillary thyroid carcinoma (PTC) including 68 of follicular variant of papillary thyroid carcinoma, 108 (15.72%) had follicular thyroid carcinoma (FTC), among the other 16 (2.43%) patients 5 (0.73%) had medullary thyroid carcinoma (MED) and 2 (0.29%) had Hurthle cell carcinoma. The data about the type of the rest 9 patients was unavailable.

In this study, most common type of surgery was found as total / near total thyroidectomy which had been done on 510 (74.23%) patients. Two to three different types of surgeries (hemi-thyroidectomy, sub-total thyroidectomy, lobectomy and completion thyroidectomy) were done in 85 (12.37%) patients. Hemi-thyroidectomy had been done in 26 patients, subtotal thyroidectomy in 26 and lobectomy in 11. Hospital documents of operation notes of 29 patients about their surgery were not available.

Among 687 patients, 485 (70.60%) were found without metastasis at the time of diagnosis, 156 (22.71%) had lymph node (LN) metastasis, 46 (6.70%) had distant metastasis. Distant metastasis sites were bone, lung and multiple sites.

Table 2. Distribution of the patients by the site of metastasis at the time of diagnosis.

Site of metastasis	Frequency	Percentage
Without Metastasis	485	70.60
Lymph Node (LN)	156	22.71
Distant	46	6.70

Table 3. Patients by their duration of follow-up.

Years of follow-up	Frequency	Percentage
Lost after ablation	100	14.56
1-4	137	19.51
5-9	182	26.49
10-14	181	26.35
15-19	64	9.32
More than 20 years	11	1.75
Expired	12	1.75

Table 3 shows the distributions of patients by their duration of follow-up. Of the total of 687 patients 100 patients did not come for follow-up after receiving RAI ablation. 137 patients came for regular follow-up for 1-4 years only and subsequently lost. Rest of the patients visited for more than 5 years. Follow-up was at least 5 years after initial therapy in 182 (26.49%), 10 or more years in 181 (26.35%), 15 or more years in 64 (9.32%) patients, 20 or more years in 11 patients. About 78.5% patients followed for 2 or more years. Among the total cases 12 expired at different times of follow-up.

Among the total cases 29 patients received low dose of I^{131} (50 mCi and less), 554 patients received 51-100 mCi of I^{131}, 81 patients received more than 100 doses up to 150 mCi as the first dose, 20 patients received up to 200 mCi and 3 patients received up to 250 mCi. Below 100 mCi of I^{131} was administered for remnant ablation in those who had no local or distant metastasis at the time of diagnosis. Up to 150 mCi were selected for lymph node metastasis and 200 mCi and above doses for distant metastasis. Table 4 shows the distribution of the patients by their first dose of I^{131}.

Table 4. No. of Patients by first dose of I^{131}.

Amount in mCi	Frequency	Percentage
≤50	29	4.22
51-100	554	80.64
101-150	81	11.79
151-200	20	2.91
201-250	3	0.44

Table 5. No. of Patients by No. of doses of I^{131}.

Number of doses	Frequency	Percentage
1	364	52.98
2-5	305	44.40
6-10	18	2.62

Maximum number of 364 (52.98%) patients received single dose of I^{131}, 305 (44.40%) patients received 2-5 doses. Only 18 patients were found to receive 6-10 doses. Table 5 shows the distribution of the patients by their number of doses of I^{131}. Cumulative doses up to 500 mCi were given to 617 (89.81%) patients. Only 9 (1.30%) patients were given cumulative doses of more than 1500 mCi. Cumulative dose of 501-1500 mCi was given to 61 patients (8.88%)

Table 6. Distribution of the patients with no metastasis at the time of diagnosis.

Type of Carcinoma	Number at diagnosis	Follow-up for less than 5 years	Follow-up for 5 years & more			
			Normal	TG High	Metastasis	Expired
PTC	406	122	265	4	LNM-11	4
FTC	70	35	29	2	MBM-1	3
Others	9	4	4	0	0	1

Table 6 shows distribution of the patients having no metastasis at all at the time of diagnosis. Total number of patients without metastasis was 485 among which 161 patients discontinued follow-up within 4 years. Remaining 324 patients undergone regular follow-up more than 5 years and 298 among them were found disease free. About 92% patients became disease free on regular follow-up for more than 5 years. Out of 324 patients, lymph node metastasis occurred in 11 patients and only 1 patient developed multiple bone metastases. Therefore, the rate of recurrence is only 3.70% in this group.

Table 7. Distribution of the patients with lymph node (LN) metastasis at the time of diagnosis.

Type of Carcinoma	Number at diagnosis	Follow-up for less than 5 years	Follow-up for 5 years & more			
			Normal	TG High	Mets	Expired
PTC	140	51	75	6	LNM-7	1
FTC	11	2	7	2	0	0
Others	5	2	2	0	LNM-1	0

Table 7 shows distribution of the patients with lymph node (LN) metastasis at the time of diagnosis. Total number of patients with lymph node (LN) metastasis was 156 among which 55 patients discontinued follow-up within 4 years. Remaining 101 patients undergone regular follow-up for more than 5 years and 84 among them were found disease free. Of them 83% patients became disease free on regular follow-up for more than 5 years. Out of 156 patients, lymph node metastasis occurred in 8 patients. Therefore, the rate of recurrence is only 7.9% in this group.

Table 8. Distribution of the patients with distant (D) metastasis at the time of diagnosis.

Type of Carcinoma	Number at diagnosis	Follow-up for less than 5 years	Follow-up for 5 years & more			
			Normal	TG High	Mets	Expired
PTC	17	9	8	0	0	0
FTC	27	11	4	6	D-3	3
Others	2	1	0	1	0	0

Table 8 shows distribution of the patients with distant (D) metastasis at the time of diagnosis. Total number of patients with distant (D) metastasis was 46 among which 21 patients discontinued follow-up within 4 years. Remaining 25 patients undergone regular follow-up for more than 5 years and 12 (48%) among them were found disease free. Of the 25 patients, distant metastasis occurred in 3 patients. Therefore, the rate of recurrence is only 12% in this group.
Among the total 687 patients 12 died in different times of their follow-up.

4. Discussion

The ratio of female to male in the study is almost 2:1 which is comparable to other's study. In studies of Catharina Ihre Lundgren 1.9:1, Mazzaferri *et al*. 1.6:1, Mazzaferri and Jhiang 2.2:1, and Caron N. R 3:1 respectively [7][6][2][1]. The most of the patients affected in thyroid carcinoma (DTC) in our study belongs to 19-40 years age group (57.8%). Children and adolescent population is only 7.5%

which is comparable to the study of Caron N. R. which is less than 10% [1]. In this study out of 687 patients 81.80% were PTC and only 15.72% were FTC. It is comparable to the study of Catharina *et al*. (PTC 70%) [7]. 81% of PTC in Mazzaferri *et al*. [6]. 77% PTC in Hundahl *et al*. [8]. Patients came for RAI therapy mostly after total or near total thyroidectomy. In our study total thyroidectomy is 74.23%. This finding is similar with the study of Hundahl *et al*. Among the 324 patients having no metastasis at the time of diagnosis and who had undergone regular follow-up for 5 years and more, 298 (92)% became disease free, recurrence of 11 cases with lymph node metastasis and 1 with multiple bone metastases were found resulting in a rate of recurrence only 3.70%. Again, among 101 patients with lymph node metastasis at the time of diagnosis under follow-up of 5 years or more, 84 (83%) patients became disease free, recurrence was found in 8 (7.9%) patients with lymph node metastasis. In the distant metastasis group, 25 patients out of 46 who undergone follow-up for more than 5 years, 12 (48%) patients became disease free and recurrence of distant metastasis occurred in 3 patients (12% only).

5. Conclusions

It is clear that the post-thyroidectomy patients those have received long term and regular follow up after radioiodine therapy had good prognosis.

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