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The Effectiveness of Radioactive Iodine Doses 30Mci and 50Mci in the Treatment of Thyroid Gland Cancer

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Abstract

Radioiodine therapy is crucial for treating thyroid disorders, specifically thyroid cancer. This study aims to evaluate the efficacy of 30mCi and 50mCi radioiodine therapy doses in low-risk papillary thyroid carcinoma patient's post-thyroidectomy, based on their thyroglobulin levels. In order to achieve this goal, we have carefully analyzed and evaluated the thy Ro globulin levels before and after radioiodine treatment, while also examining the values from different viewpoints. In our thorough analysis, we found that about 90% of study participants experienced positive outcomes, indicating a high success rate. The study shows that both radioiodine therapy doses effectively reduced thyroglobulin levels in low-risk papillary thyroid carcinoma patients post-thyroidectomy. This provides insights into the optimal therapy dosage for this patient group.

Keywords: Radioactive, Iodine Doses, Treatment, Thyroid, Gland Cancer.

Introduction

Radioiodine therapy, also known as Radioactive iodine therapy or RAI therapy, has been a cornerstone in the treatment of Thyroid disorders since the early 1940s and is commonly used as a follow-up Treatment for Thyroid Cancer after a Surgery [1-10].

Thyroid Cancer, especially Papillary Thyroid Cancer, is the most common type of Thyroid Cancer, and it tends to respond well to Radioiodine Therapy. Radioactive iodine destroys Thyroid and Cancer cells, reducing recurrence risk. Safe and effective with minimal side effects. Essential for Thyroid Cancer Treatment.

Experimental

In our research, we are enrolling 20 patients. 3 man 17 Women
The average Age of the patients is 47 Years
Pathology Distribution: PT1aNxMx 7 and PT1bNxMx 12
Dose Distribution: 30 mCi 18 Patients and 50 mCi 2 Patients
Radiopharmaceutical and Dosimetry
Radiopharmaceutical
IODINE- 131 Oral Capsule
Pharmaceutical form: Hard capsule, oral delivery.

Content

Hard gelatine capsule containing sodium iodide (Na−131I), disodium hydrogen phosphate, sodium thiosulfate, and sodium carbonate-bicarbonate buffer.
Biological half-life: 5.5 days
Effective half-life: 3.26 days.

Packaging

A hard gelatine capsule in a polypropylene plastic tube within a lead shield and a polymathy methacrylate capsule ingestion (a tube) apparatus in a box [11-20].

Dosimetry

PT1a Nx Mx = 30 mCi ; 50 mCi

PT1a Nx Mx = 30 mCi ; 50 mCi

PT1b Nx Mx = 30 mCi ; 50 mCi

Error in Prescribed Dose EPD> 10%

Error in Prescribed Dose EPD< 1%

$$A_{30\,mCi}(10\%) = \frac{10\% \times 30mCi}{100\%} + 30mCi = 33\ mCi \leq 10\%$$

$A_{30\,mCi}(1\%) = 30\ mCi - \frac{1\% \times 30mCi}{100\%} = 29\ mCi \geq 1\%$

$A_{50mCi}(10\%) = \frac{10\% \times 50mCi}{100\%} + 50mCi = 55\ mCi \leq 10\%$

$A_{50mCi}(1\%) = 50\ mCi - \frac{1\% \times 50mCi}{100\%} = 49\ mCi \geq 1\%$

Results and Discussion

We say that the therapy is effective if the Tg level value after RAI therapy is less than the value before RAI Therapy because Tg is a protein made by thyroid cells, Both normal or cancerous, a decrease in Thyroglobulin level in the blood means a reduction of Thyroid Cancerous cells, that mean the therapy is effective and it was killing the remnant thyroid cells, This figure represents the percentage of effectiveness of RAI therapy with 30 mCi and 50 mCi [21-30].

The figure shows that 90%(18 patients) of the patients had a positive result decrease in Tg values while 10%(2 patients) of the patients showed a negative result where the therapy was not effective, we conclude that the doses of 30 mCi and 50 mCi result in excellent outcomes for patients with low-risk pathology PT1a and PT1b [31-34].

Conclusions

Our research examined the effectiveness of 30 mCi and 50 mCi Doses in treating thyroid cancer. Especially for the type of Papillary Carcinoma, our study involved 20 patients with pathologically confirmed stage PT1a or PT1b disease.

We find that doses of 30 mCi and 50 mCi are highly effective in patients with pathologically confirmed stages PT1a and PT1b, With a success rate of around 90%. Therefore, we can rely on them for treatment.

Approximately 10% of individuals receive a negative outcome. This might occur as a result of inadequate preparation and incompetence on the part of the patient, TSH levels during treatment, and other factors that influence the process.

Table 1: Results

N	ID	Sex	age	Type	Staging	Dose RAI therapy (mCi)	Tg before RAI therapy(ng/mL)	131I Capsule activity(mCi)	Tg after RAI therapy(ng/mL)
1	78/20	F	52	PTC	PT1bN0M0	30	4.78	33.00	0.08
2	154/21	M	63	PTC	PT1bN0M0	30	5.94	31.00	0.07
3	03/22	M	55	PTC	PT1aN0M0	30	0.30	34.20	0.10
4	40/22	F	67	PTC	PT1bN0M0	30	3.38	31.10	0.29
5	51/22	F	35	PTC	PT1bN0M0	30	0.08	30,81	0.06
6	78/22	F	35	PTC	PT1bN0M0	30	2.90	30.90	20.20
7	120/22	F	35	PTC	PT1bN0M0	30	'2.70	32.90	0.25
8	04/23	F	47	PTC	PT1aN0M0	30	0.10	30.40	<0.04
9	12/023	F	49	PTC	PT1bN0M0	30	2.18	30.50	0.07
10	16/23	F	50	microPTC	PT1aN0M0	30	5.84	30.70	0.19
11	120/23	M	48	microPTC	PT1aN0M0	30	0.20	29.00	0.52
12	130/23	F	44	PTC	PT1aN0M0	30	0.49	28.50	0.29
13	231/23	F	61	PTC	PT1bN0M0	30	3.85	33.40	0.29
14	215/23	F	56	PTC	PT1bN0M0	30	3.06	30.51	0.10
15	199/23	F	28	PTC	PT1bN0M0	30	4.16	31.90	2.98
16	173/23	F	54	PTC	PT1bN0M0	30	7.94	32.70	0.10
17	330/23	F	25	PTC	PT1bN0M0	50	5.43	51.10	1.60
18	354/23	F	69	PTC	PT1aN0M0	50	0.10	54.90	<0.04
19	170/22	F	43	PTC	PT1aN0M0	30	24.01	31.28	0.10
20	212/23	F	35	PTC	PT1bN0M0	30	13.10	31,90	0.10

Table 2.

Situation	Thyroglobulin Level
Normal (non-thyroid cancer)	< 0.2
Thyroid cancer surveillance	Variable, > 0.2
Suspected recurrence	Elevated
Post-treatment monitoring	Undetectable/low

Table 3.1: Thyroglobulin values (ng/mL)

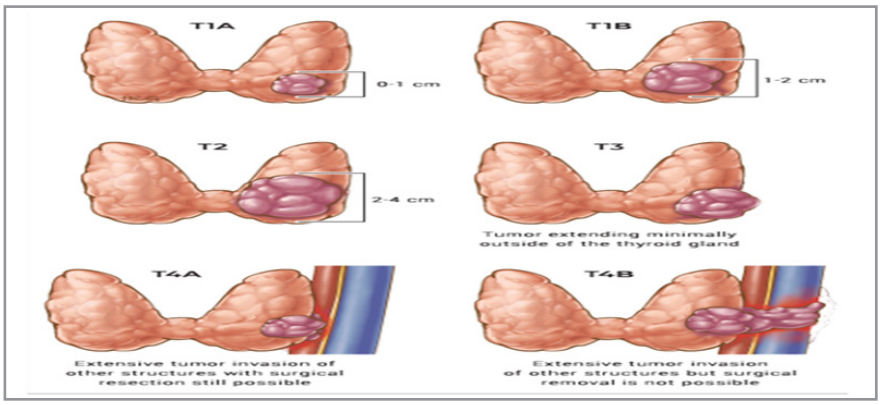

Figure 1

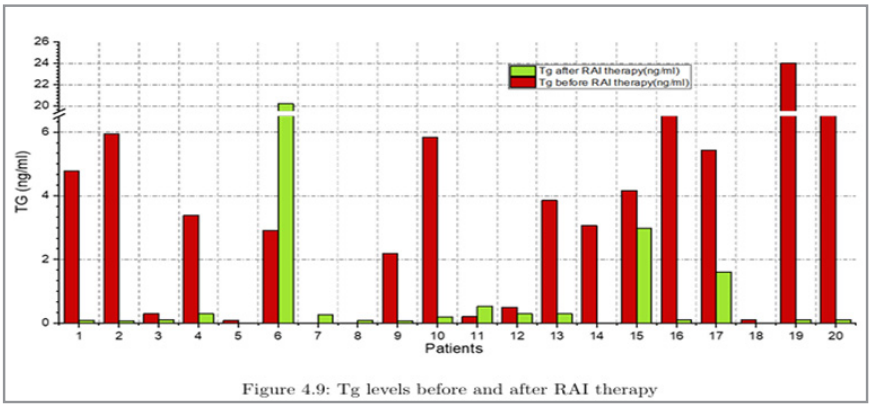

Figure 2

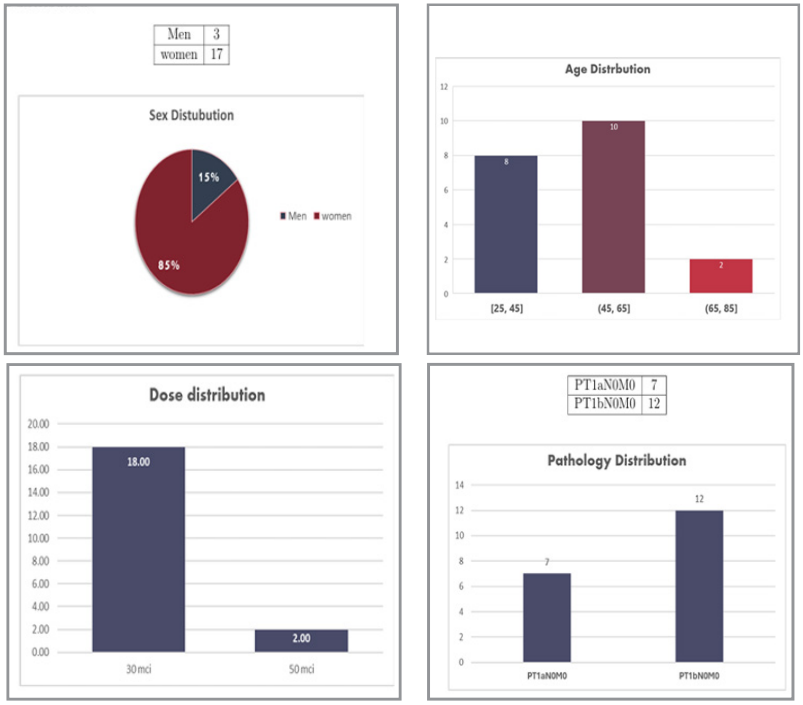

Figure 3

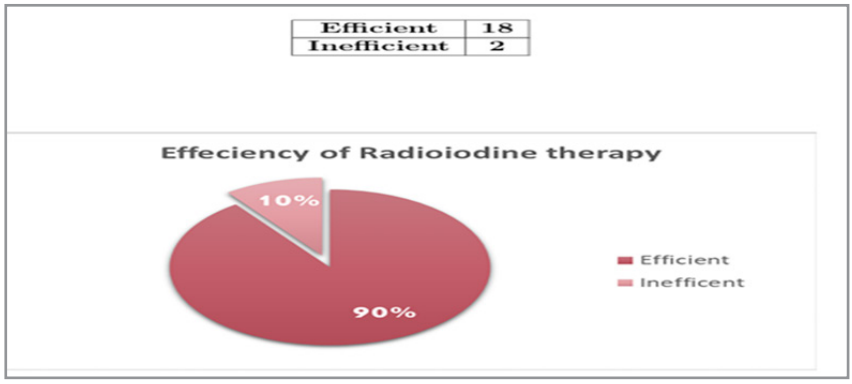

Figure 4

Recommendations

According to the recommendations approved by IAEA in medical applications in Nuclear Medicine , which stipulate that patients who underwent RAI therapy should be followed up after 6 months to determine the success of the 1 Cur or the patient needs a second Cur , for this reason the 10% Category who we recorded did not respond to Cur in the first 3 months maybe we record positive results during the second 3 months .

Suggestions for improving the efficiency of radioiodine therapy includes developing an individualized dosimetry approach to determine the optimal dosage for each patient.

This approach should take into consideration the differences between patients, such as absorption rate and the specific state of the patient, in order to ensure a balance between therapeutic efficacy and radiation exposure.

Radioiodine therapy is a highly successful treatment option that is commonly used to reduce the risk of cancer recurrence. This method has been proven to be an efficient and reliable way to prevent the return of the disease.

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