

¹³¹IODINE THERAPY IN THYROTOXICOSIS

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ABSTRACT

Radioiodine ¹³¹I therapy is becoming popular for treatment of thyrotoxicosis in Bangladesh and well-differentiated thyroid cancers. ¹³¹I therapy was started at Rangpur in 1989 (brought from Nuclear Medicine Center, Dinajpur). Up to February, 2000, 161 thyrotoxic patients (F96, M65) of age range 16 to 70 yrs. (diffuse 123, nodular 38), had ¹³¹I therapy. Most of our patients are improved by small single dose of ¹³¹I therapy and are being followed-up.

Key words : ¹³¹Iodine therapy, thyrotoxicosis.

INTRODUCTION

Radioiodine is used in thyroid studies since 1939¹ Beta-rays of ¹³¹I (0.606 and 0.33 million electron : volts) ablate thyroid cells and therefore, used as a therapeutic agent in thyrotoxicosis and well-differentiated cancers of thyroid gland. The other options are surgery, antithyroid drugs. (e.g. Carbimazole) or percutaneous ethanol injection of autonomously functioning thyroid nodules²

In Britain and USA, mortality from thyrotoxicosis peaked between 1923 to 1940 and incidence remained highest in those areas which once had endemic goitre,^{3,4} but in 1977 it came down to 1.9-2.7 % in adult females of North-East England.⁵ However, we are still lagging behind in the less developed countries, e.g. in Bandar Abbass (Iran), about 12 % (49 of 381 patients) hyperthyroidism was found in 1994⁶ and in Nuclear Medicine Center, Rangpur, 28% of 309 patients were thyrotoxic in 1998.⁷

The ¹³¹I dose for thyrotoxicosis is usually computed on the basis of delivering a selected (about 100 micro-Curie, μ Ci) dose per gm of thyroid tissue.

$$\text{Dose } (\mu\text{Ci}) = \frac{\mu\text{Ci/gm} \times \text{thyroid wt. (gm)} \times 100}{\% \text{ } ^{131}\text{I uptake at 24 h.}}$$

Some Centres use high ablative dose. The incidence of post-radioiodine hypothyroidism is almost equal to that following surgery or drug therapy (2-3% per year). The natural history of Graves' disease may be one of a hyperthyroid phase, followed eventually by hypothyroidism.⁸ Various dose schedules e.g. as small as 0.5 milliCurie (mCi)⁹ to high ablative dose ranging as big as 20 to 100 mCi at the University of Minnesota Hospital U.S.A have been used to treat thyrotoxicosis.^{10,11} Thyroid unit of Royal Marsden Hospital¹² (Sutton, UK) uses 2 mCi dose in the treatment of Graves' disease since January 1979, repeated doses are given there after 6-monthly intervals. In Bangladesh, Institute of Nuclear Medicine, Dhaka, Atomic Energy Medical Centre, Chittagong, Nuclear Medicine Centres of Rajshahi and Dinajpur had published results of radioiodine therapy. Here we like to describe initial experiences of radioiodine therapy at Rangpur since 1989.

MATERIALS AND METHODS

The patients referred to this centre for suspected thyroid disease were analysed by careful clinical history, physical examination, radioiodine uptake (2,24,48hrs. after oral 10-15 μ Ci dose of ^{131}I , thyroid scans, and serum levels of triiodothyronine (T_3), thyroxine (T_4) and thyrotropin (TSH) by radio-assays (radioimmunoassay, RIA and/or immunoradiometric assay IRMA).

One hundred and sixty one thyrotoxic patients (F96, M65) were advised to receive oral radioiodine therapy (which did not require any hospitalization), if agreeable to their referring physicians. Regular follow-ups beginning on the 10th week after radioiodine therapy is done in this Centre.

RESULTS

Results are tabulated in Tables 1-3, Only one patients (M50) became hypothyroid 2 years after & 3mCi dose of ^{131}I , however, long-term follow up are being done. Most of the patients are between 30-59 years of age and received single small dose of ^{131}I . Twenty four patients (15%) had carbimazole prior to ^{131}I therapy, amongst them one had severe rash, another had agranulocytosis and others were non-responsive to carbimazole.

DISCUSSION

No serious complication was seen following radioiodine ^{131}I therapy. Long-term follow up is being performed routinely to detect further

recurrence (s) and/or hypothyroidism. Treatment of hypothyroidism is quite straightforward and much easier than recurrent thyrotoxicosis.

One of the concerns of radioiodine therapy has been late radiation side-effects. It should not be used during pregnancy. However, extensive studies have failed to show ^{131}I related neoplasm or birth defects. Since the gonadal exposure is extremely low (less than a diagnostic radiograph), genetic effects are unlikely. In the cooperative follow up study¹³, comparison of the incidence of thyroid cancer in patients who had surgery (50 cancers in 11,732 patients) compared with those who had radioiodine therapy (19 cancers more than 1 year after ^{131}I in 21,714 patients) showed fewer cancers after the radioiodine therapy. Henneman and colleagues¹⁴ noted that in Graves' disease and toxic multinodular goitre the remission rate is only 40—50 % after antithyroid drugs, these drugs have little effect in toxic adenoma and after ^{131}I (radioiodine) therapy, the risk of malignant diseases and genetic abnormalities is not significantly greater in any age group. Older textbooks mentioned that children and adolescents should not be treated with radioiodine for thyrotoxicosis, but recent research works are in favour of radioiodine, rather antithyroid drugs e.g. carbimazole can give rise to serious side-effects¹⁵.

Since 1997 we are facing scarcity of ^{131}I as AERE (Savar) is not producing it, however, most of our patients are improved by relatively small doses of ^{131}I .

Table 1. Age-Sex distribution.

| Age in years | Female | | Male |
|--------------|--------|---|-------------------|
| 15 - 20 | 1 | | 0 |
| 21 - 29 | 6 | | 3 |
| 30 - 39 | 28 | | 14 |
| 40 - 49 | 31 | | 22 |
| 50 - 59 | 20 | | 17 |
| 60 - 69 | 6 | | 8 |
| 70 - 79 | 4 | | 1 |
| Total = | 96 | + | 65 = 161 patients |

Table 2. Number of Doses.

| | |
|---------------|--------------|
| One | 133 |
| Two | 22 |
| Three or more | 6 |
| Total = | 161 patients |

Table 3. Dose ranges (Total milliCuries)

| | |
|------------------|---------------|
| 0.5 - 2 mCi | 85 patients |
| 2.1 - 5 mCi | 60 " |
| 5.1- 10 mCi | 14 " |
| More than 10 mCi | 2 " |
| Total = | 161 patients. |

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