

PILOT STUDY ON LOW DOSE RADIOIODINE ABLATION OF THYROID REMNANTS

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Introduction

Differentiated thyroid carcinoma (DTC) is almost curable if adequately treated with surgical excision and radioactive iodine (Verkooijen, *et al.*, 2008; Bal *et al.*, 2004). Even after “total or near total” thyroidectomy, patients with DTC may have residual thyroid tissues in the thyroid bed. Presence of residual tissues may not allow sufficient radioiodine accumulation in local or distant metastases, hence increases the risk of getting recurrences and poor response to radioiodine therapy during subsequent follow up. Radioiodine residual ablation plays a big role in the management of DTC and has four major goals. Residual ablation reduces the chance of the thyroid cancer recurrences by destroying the occult microscopic carcinoma cells within the thyroid remnant. It improves the sensitivity of the radioiodine whole body scan to monitor any recurrences and facilitates the use of serum thyroglobulin. Residual ablation enhances the effectiveness of future radioiodine treatments, if needed (Pacini *et al.*, 2006). Studies have shown that residual thyroid ablation can be achieved with low dose (30mCi) of radioactive iodine (Bal *et al.*, 2004, Pacini *et al.*, 2002, Pacini *et al.*, 2005). Nuclear Medicine unit (NMU), Peradeniya has started residual ablation using 30mCi (low dose) as out patient basis since February 2006. The aim of the study

was to assess the efficiency of this radionuclide therapy procedure in the management of DTC.

Materials and Methods

Patients who had near total thyroidectomy or total thyroidectomy and pathological diagnosis of DTC were referred for routine whole body scan (WBS) for the assessment of residual thyroid tissues and thyroid metastases. All patients were given clear instruction on residual ablation and preparation for WBS. Patients were asked not to start thyroxine at least 4-6 weeks following surgery or discontinue thyroxine for similar period to make them adequately hypothyroid (TSH>30mIU/L) before RAI was administered. Serum TSH and thyroglobulin (sTg) were measured before administration of RAI. WBS was performed 48h after 3-5mCi of liquid RAI, which was administered on an empty stomach. Patients with no or poor thyroid bed uptake and serum Tg less than 5ng/L were considered as adequately ablated and advised to restart thyroxine. Patients with significant thyroid bed uptake detected by the WBS and without distant metastases or sTg over 5ng/L were given 30mCi of RAI within one week of the WBS (This is the maximum allowed activity for out patient treatment in Sri Lanka). All patients were advised to resume thyroxine after 3 days of RAI therapy. When RAI is not available or insufficient for

residual ablation, they were referred to the Oncology unit Kandy or Maharagama for ablation. Patients with very high serum Tg or/and distant metastases were also referred to the oncology units where inward facilities are available for high dose therapy. Post therapy WBS was done on some patients.

Results

Between February 2006 and December 2007 a total 150 DTC patients were referred to NMU, University of Peradeniya for WBS/RAI therapy. There were 123 females and 27 males (F: M= 4.5:1). Of these patients, 92% had total or near total thyroidectomy and 64 (42%) patients had sTg less than 0.5 ng/l with negative WBS indicative of successful ablation either by surgery or combine surgery and RAI. They were considered as free of metastases.

Sixty two WBS (41%) showed residual thyroid tissues with mean sTg of 29.9 ng/L (SD \pm 25.5). Of them only 30% (19/62) received 30 mCi of liquid radioiodine and 13 had post therapy scan. None of them showed additional lesions on post therapy scan except residual thyroid seen in the thyroid bed which is expected to be destroyed during the course of radioiodine therapy. Rest of the patients with residual tissues were referred to the oncology unit as sufficient radioactive iodine was not available for ablation. A total of 24 (16%) WBS showed lymph nodes or bone metastases with elevated sTg (mean 34.7 ng/L). They were referred to Oncologists for high dose therapy. Table 1 shows the summary of RAI therapy procedures and WBS carried

out in this unit during last 2 years using liquid radioactive iodine.

Discussion and Conclusion

This study showed that 42% of DTC patients were successfully ablated either by surgically or both surgical and previous RAI therapy. However, another 41% had significant residual thyroid tissues at the time of presentation and of them only 1/3rd received ablation dose of RAI (30mCi) followed by the WBS. Though the RAI residual ablation of all patients with DTC is still controversial (Pacini *et al.*, 2006) many studies have shown the advantages of RAI remnant ablation (Verkooijen *et al.*, 2008, Doi *et al.*, 2007, Bal *et al.*, 2004) and also successful ablation using 30mCi of RAI as an out patient basis (Bal *et al.*, 2004). This study was aimed to assess the RAI ablation facility at in the NMU, however due to short study period and lack of proper referral system and the central database it was not possible to identify the number of patients who received subsequent RAI therapy in the oncology units, the duration of delay of such therapy and also how many were left without residual ablation. There is a high demand for radioiodine WBS and therapy. Though DTC is almost curable, our patients are not receiving "optimum" care due to lack of facilities and inadequate radioiodine supply. Improvement of RAI therapy facility is needed to provide optimum and efficient treatment for DTC in our set-up.

Table 1. WBS and residual ablations done at the NMU

| | <i>No of patients</i> | | |
|--|-----------------------|-------------|--------------|
| | <i>2006</i> | <i>2007</i> | <i>Total</i> |
| <i>3-5 mCi for WBS</i> | 68 | 82 | 150 |
| <i>Normal WBS + normal sTg</i> | 29 | 35 | 64 (42%) |
| <i>Residual thyroid tissues with moderately elevated sTg</i> | 32 | 30 | 62 (41%) |
| <i>Local or distant metastases</i> | 14 | 10 | 24 (16%) |
| <i>30mCi Residual ablation</i> | 06 | 13 | 19 (30%) |

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