INTRODUCTION

The radionuclide agent of choice in evaluating primary and metastatic carcinoma of thyroid (well-differentiated types only) is iodine-123 (¹²³I) and ¹³¹I. ¹⁹⁹mTc pertechnetate (¹⁹⁹mTcO₄⁻) imaging is done as a base line investigation for evaluating thyroidal mass abnormalities and functional status because of the obvious advantages of the low radiation burden, convenience and cost.¹ ²

¹⁹⁹mTcO₄⁻ is usually not taken up by lymph nodes involved by malignant cells originating from primary carcinoma thyroid. Observing avid uptake of ¹⁹⁹mTcO₄⁻ by lymph nodes involved in malignancy is an unusual finding.³ Here, we present 3 cases of avid ¹⁹⁹mTcO₄⁻ uptake by regional lymph nodes involved in locally advanced well differentiated thyroid carcinoma (DTC).

CASE REPORT

CASE 1:

A female, 37 years of age, Afghan ethnic origin, presented with a history of anterior neck swelling of 8 months duration with nervousness, irritability with tremors and weightlessness. There was no past history of radiation exposure to the head and neck.

Physical examination revealed a remarkably anxious patient with fine tremors of the outstretched sweaty hands. Pulse rate was 106 beats/minute with blood pressure 110/70 mm/Hg. Local examination of the neck revealed multinodular goiter with palpable, moderately enlarged, firm and mobile lymph nodes in the neck.

Chest X-ray, routine biochemical and haematological profiles were normal. Abdominal ultrasonography was negative for visceral metastasis. Thyroid hormone profile showed hyperthyroxinemia with serum total T4 of 324 nmol/L and TSH of 0.08 uIU/mL. Thyroid scan obtained 20 minutes following intravenous injection of 74 MBq (2mCi) of ¹⁹⁹mTcO₄⁻ showed inhomogenety with multiple foci of reduced and increased tracer distribution in the thyroid gland (Figure 1). There was a cold lesion in the lower pole of the right lobe of the thyroid gland extending into the isthmus plus multiple abnormal extrathyroidal accumulation of tracer on both sides of the thyroid gland. The relative thyroid-to-background ratio in the ¹⁹⁹mTcO₄⁻ study, however, appeared higher than usual. Being thyrotoxic, she was booked for radioactive iodine (¹³¹I) therapy.

Meanwhile, her fine needle aspiration cytology (FNAC) report of specimens from the thyroid cold nodule and lymph nodes revealed presence of malignant cells. As there was avid ¹⁹⁹mTcO₄⁻ uptake by locally involved lymph nodes, the patient was also subjected to ¹³¹I whole body scan to find any additional metastatic deposits in other groups of lymph nodes and viscera. ¹³¹I whole body scan was performed showing almost similar uptake to the pertechnetate uptake with additional uptake in the cold nodule seen on pertechnetate and extensive homogenous lung uptake (Figure 2). She was advised near total thyroidectomy with radical neck dissection. She underwent uneventful surgery in a tertiary care hospital of the region. Biopsy of the resected specimen showed follicular variant of papillary carcinoma of thyroid.
thyroid carcinoma with extrathyroidal tumour extension into surrounding soft tissue and involvement of all the 6 resected cervical lymph nodes.

CASE 2: A local resident young woman was examined by ear, neck throat (ENT) surgeon for neck masses of 2 years duration. She was 28 years old, married, had a 2 years old baby and otherwise clinically un-remarkable. Neck ultrasound showed enlargement of the left lobe of thyroid gland, containing multiple complex lesions; the largest measuring 2 x 3 cm with calcification. Multiple enlarged lymph nodes on left side of the neck were also seen. FNAC of the lesions were performed. The report was suggestive of follicular/papillary carcinoma. She was advised for surgery but she refused further management. After a lapse of one year, she consulted the surgeon again for the recent increase in size of the neck masses. Near total thyroidectomy with neck dissection was done. The biopsy confirmed the diagnosis of papillary carcinoma thyroid with spread into loco-regional lymph nodes. All cervical lymph nodes at levels II, III and IV were positive for metastatic involvement. Due to logistic and financial constraints, she visited our institute 2 months after surgery. There was no previous history of irradiation to the head and neck. General physical examination was unremarkable. Pulse rate and blood pressure were in the normal range. Systemic examination was unremarkable. Local examination of the neck showed a healed scar of thyroidectomy and a large swelling just below the left parotid region. Her thyroid hormone profile was within normal range showing normal serum T4. Chest X-ray and biochemical profile were normal. Abdominal ultrasonography was negative for visceral metastases.

DISCUSSION

Radioisotopic detection of lymph node metastases secondary to thyroid cancer is quite uncommon in the presence of native thyroid tissue. Many reports have shown, however, that pre-operative accumulation of radioiodine, Tc-pertechnetate or both within cervical lymph nodes generally portends a diagnosis of thyroid carcinoma with metastatic spread.

In developing world, where $^{131}$I is not usually available, the $^{131}$I whole body scan is regarded as the modality of choice for the detection of remnant and assessment of locally advanced and/or metastasized thyroid carcinoma. In this context, the role of thyroid scan with pertechnetate in the diagnostic workup of patients with suspected or proven well-differentiated malignancy of thyroid has been a matter of debate for decades. There are many reasons mentioned against the use of $^{99m}$TcO$_4$ scan. It has non-specific action and gets trapped but not organified. It does not show the extent of disease.
the presence of large bulk of thyroid tissue, extra-thyroidal uptake is less likely to be seen. If a focus takes up iodine, it is definitely trapped, hence trapping is intact.

The advocates of 99mTcO4 scan argue that 99mTcO4 is a convenient test for looking into thyroid remnant size with low radiation burden. In the presence of intact thyroid remnant, due to stunning effect, there is least likelihood of seeing locally advanced disease. It easily tells about the extent of surgical debulking of thyroid. 99mTcO4 has no stunning effect like 123I that compromise the subsequent 131I therapeutic effect.

In our department, we some time image patients pre- and postoperatively for the evaluation of thyroid remnant with 99mTcO4. Although owing to its mechanism of uptake, pertechnetate has been regarded as inferior imaging choice when the question of imaging of locally advanced disease is to be answered as many suggest it does not concentrate in metastatic deposits. Here we present 3 cases that showed extrathyroidal pertechnetate uptake, one pre-operative and two postoperative.

In this limited series of patients imaged with 99mTcO4, all the 3 cases had positive lymph node uptake in the neck. Two of the cases were diagnosed later on to have carcinoma thyroid with nodal metastasis while one was a confirmed carcinoma thyroid case, which presented with mass in the neck soon after surgery and was prepared for ablative dose of 131I. One patient was hyperthyroid as well at the time of presentation indicating functioning metastasis representing the higher degree of differentiation of the malignant transformation. The hyperthyroidism can not only be attributed to the hyperfunctioning of the thyroid metastasis but to the large bulk of nearly similar differentiated thyroid tissue. Similar cases have been reported in the literature in which pertechnetate uptake in metastatic deposits have been documented with little emphasis on its correlation with degree of differentiation. Katagiri et al. emphasized on the trapping mechanism of the cancerous tissue.

The unusual findings of seeing lymph nodes involved in metastatic process in carcinoma thyroid with pertechnetate are not clearly understood as in most instances, one does not come across such findings. The reasons given for not seeing lymph nodes on pertechnetate scan especially in intact thyroid are lesser than normal differentiation of malignant tissue; Steel effect of large reservoir of intact thyroid and the presence of large radioactive source obliterating the faint uptakes in the lymph nodes.

However, in this series of cases, there was an uptake in the cervical lymph nodes negating partly the above stated reasons. It may be proposed that the degree of differentiation is of prime importance in describing these issues. Also sodium iodide symporter (NIS) is always expressed in more differentiated thyroid cancer, whereas it is often negative in less well-differentiated thyroid cancers. NIS transports iodine and pertechnetate inside the thyroid follicles. All the 3 cases described here were of well-differentiated type showing intact trapping mechanism in the primary tumour as well as in the involved lymph nodes.

REFERENCES