

The Role of Intraoperative Gamma Probe and Parathyroid Hormone Measurement in the Localization of Intrathyroidal Parathyroid Adenoma

Cigdem Soydal, Volkan Genc, Mine Araz, Cihangir Akyol, Ozlem N Kucuk

ABSTRACT

In this case, we would like to introduce a case with intrathyroidal parathyroid adenoma in which planar Tc-99m scintigraphy and intraoperative gamma probe were insufficient but single photon emission computed tomography imaging and intraoperative parathyroid hormone measurement were helpful in localizing the adenoma.

Keywords: Parathyroid gland, Parathyroid scintigraphy, Gamma probe.

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INTRODUCTION

Technetium-99m methoxyisobutylisonitrile (Tc-99m MIBI) scintigraphy has been widely accepted as imaging tool in the preoperative localization of parathyroid adenomas, especially in patients with persistent or recurrent hyperparathyroidism.¹ Application of intraoperative gamma probe is being increasingly used in detection of ectopic parathyroid tissue or confirmation of total excision of parathyroid tissue.²⁻⁴ But the utility of gamma probe is not established in cases with intrathyroidal parathyroid adenoma. Intraoperative parathyroid hormone (IOPTH) measurement also can be used for confirmation of possible intrathyroidal parathyroid adenomas.⁵⁻⁷

We would like to introduce a case with intrathyroidal parathyroid adenoma in which planar Tc-99m planar scintigraphy and intraoperative gamma probe were insufficient but single photon emission computed tomography (SPECT) imaging and IOPTH measurement were helpful to locate the adenoma.

CASE REPORT

A 68-year-old female patient was referred to Ankara University Medical School, Department of Nuclear Medicine for Tc-99m MIBI parathyroid scintigraphy because of primary hyperparathyroidism. She had been operated twice before. The first operation was a negative exploration. In the second operation, right lobectomy of

thyroid gland was performed due to suspicion of intrathyroidal parathyroid on neck upper section. However, after second operation, hypercalcemia symptoms persisted and serum parathyroid hormone level remained elevated [228 pg/ml (range: 12-88 pg/ml)].

Planar parathyroid scintigraphy was performed at 10th minutes, 1st, 2nd and 4th hours after intravenous injection of 15 mCi Tc-99m MIBI. Also serial SPECT images were obtained from neck and thorax immediately after 2nd hour planar image. In planar images, left thyroid lobe was seen in early images and then the activity washed out from thyroid (Fig. 1). These images were totally normal. Interestingly, in SPECT images suspected focal uptake in the lower pole of left thyroid lobe was seen (Fig. 2). Because the patient had undergone operation twice, a neck magnetic resonance imaging was performed before the third surgery which could not localize the parathyroid adenoma. A neck exploration was then performed; 120 minutes before surgery, 15 mCi Tc-99m MIBI was administered to patient and during surgery a gamma probe application was done for accurate localization of parathyroid adenoma. In the neck, no focus

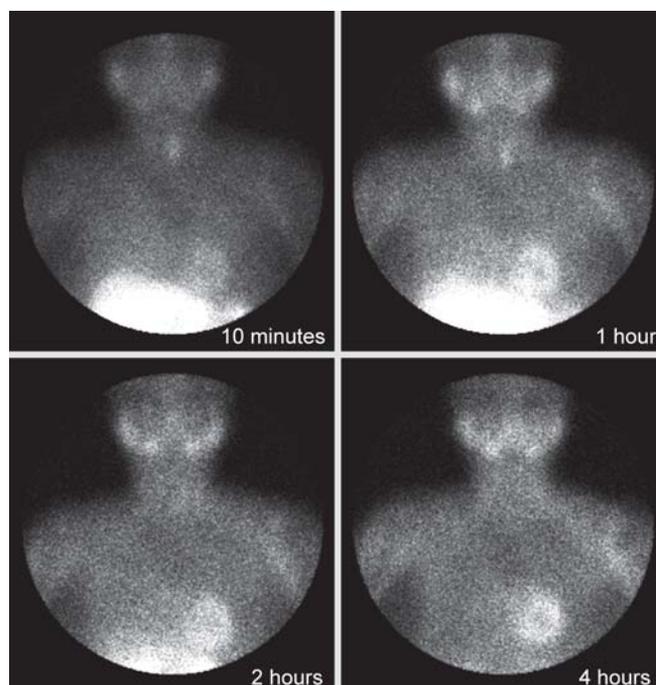


Fig. 1: After intravenous injection of 15 mCi Tc-99m MIBI, 10th minute and 1st hour planar parathyroid scintigraphy images show left thyroid lobe and then, in the 2nd and 4th hour images, the activity washed out from thyroid. These images were interpreted as normal

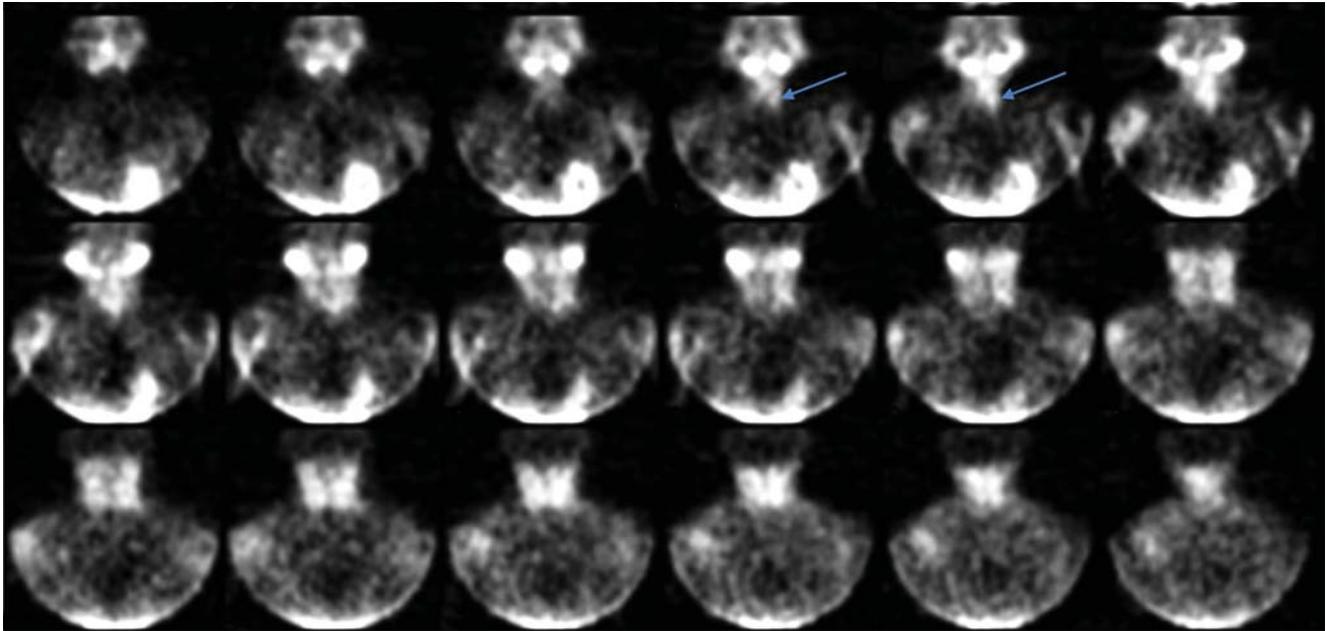


Fig. 2: In 2nd hour serial SPECT images of neck and thorax, a suspected focal uptake in the lower pole of left thyroid lobe was seen (arrows)

with more count than thyroid tissue was detected by gamma probe. A left thyroid lobectomy was planned due to presence of possible intrathyroid parathyroid adenoma. Intraoperative parathyroid hormone levels were measured before and after lobectomy. Although serum parathyroid hormone level was measured as 227 pg/ml in the beginning of the surgery, it dramatically decreased to 17 pg/ml after completion of thyroidectomy. A 12 mm intrathyroidal parathyroid adenoma was proved by histopathological examination of lobectomy material.

CONCLUSION

Tc-99m MIBI SPECT imaging is more sensitive than planar scintigraphy in the localization of parathyroid adenomas. Intraoperative gamma probe might be insufficient in these cases and IOPTH measurements might be helpful in the confirmation of successful parathyroidectomy.

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ABOUT THE AUTHORS

Cigdem Soydal (Corresponding Author)

Consultant, Department of Nuclear Medicine, Faculty of Medicine Ankara University Medical School, Ankara University, Cebeci Ankara-06590, Turkey, Phone: 90-312-5956445, Fax: 90-312-3620897 e-mail: csoydal@yahoo.com

Volkan Genc

Consultant, Department of Surgery, Ankara University Medical School, Ankara University, Mamak, Turkey

Mine Araz

Resident, Department of Nuclear Medicine, Ankara University Medical School, Ankara University, Mamak, Turkey

Cihangir Akyol

Consultant, Department of Surgery, Ankara University Medical School Ankara University, Mamak, Turkey

Ozlem N Kucuk

Professor, Department of Nuclear Medicine, Ankara University Medical School, Ankara University, Mamak, Turkey