

A CASE OF PARATHYROID ADENOMA WITH BROWN TUMORS DIAGNOSED BY ²⁰¹THALLIUM – ^{99m}TECHNETIUM SUBTRACTION SCINTIGRAPHY*

*Hatice Durak MD** , Tülin Aras MD*** , Günaydın Erben MD****
Coşkun F. Bekdik MD******

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The preoperative localization of enlarged parathyroids which is the most important step in the surgical approach to primary hyperparathyroidism has always presented difficulties. Numerous diagnostic procedures have therefore been proposed, including scintigraphy. Since first described by Ferlin et al¹ in 1981, ²⁰¹thallium-^{99m}technetium subtraction scintigraphy has become a reliable method for localizing parathyroid adenomas. Young et al² (1983), Percival et al³ (1985), Skibber et al⁴ (1985), and Blake et al⁵ (1986) have reported that the ²⁰¹thallium-^{99m}technetium subtraction scintigraphy technique successfully localizes the vast majority of parathyroid adenomas.

Case Report

A 15-year-old girl was admitted to Hacettepe University Hospital presenting with swelling of the extremities and disturbance of gait. Physical examination revealed swellings on the chin, left wrist, knees and ankles. Since bone radiographs demonstrated disseminated lytic lesions, primary hyperparathyroidism was suspected.

Laboratory studies revealed a serum calcium level of 13.1 mg/dl and a serum phosphorus level of 3 mg/dl. A 24-hour urine sample collected for calcium determination yielded a value of 39 mg/dl. The C-terminal parathyroid hormone level was 9.54 ng/ml. Biopsy findings revealed Brown tumors. Whole-body ²⁰¹thallium-^{99m}technetium subtraction scintigraphy was performed as described by Young et al² with some modifications. Thyroid scintigraphy revealed a normal-sized thyroid with smooth borders. Subtraction scintigraphy demonstrated a focal 2.3 × 3.5 cm area of increased ²⁰¹thallium uptake localized below the inferior pole of the right lobe of the thyroid. Focally increased ²⁰¹thallium uptake

* From the Department of Nuclear Medicine, Hacettepe University Faculty of Medicine, Ankara.

** Resident in Nuclear Medicine, Hacettepe University Faculty of Medicine.

*** Assistant Professor of Nuclear Medicine, Hacettepe University Faculty of Medicine.

**** Professor of Nuclear Medicine, Hacettepe University Faculty of Medicine.

was detected on both parietal bones, right corpus mandibulae, right iliac wing, distal femur, left proximal and distal tibiae, right distal tibiae, 5th metatarsal bones of the left foot and on the left wrist (Figs. 1-3).

A parathyroid adenoma was found during surgery which was located below the inferior pole of the right lobe of the thyroid. A bone biopsy was performed on two of the lytic sites, illustrated on the radiographs, and the histopathological diagnosis was Brown tumor.

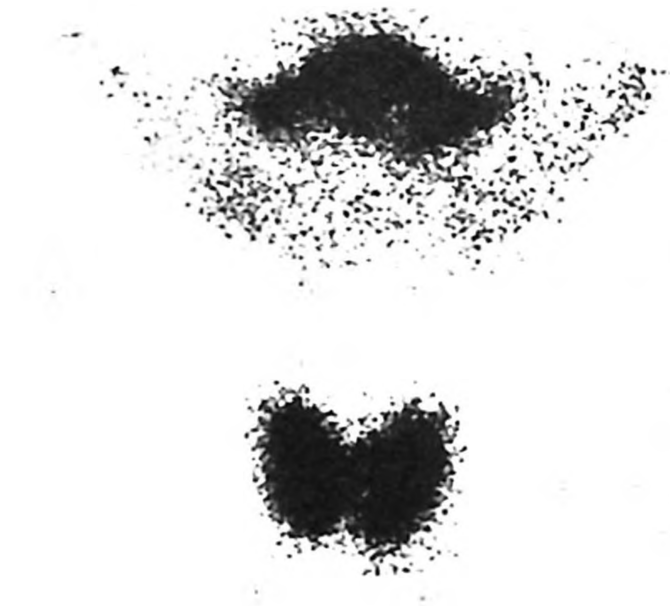


Fig. 1: ^{99m}Tc pertechnetate thyroid scan: Normal thyroid gland with smooth borders.

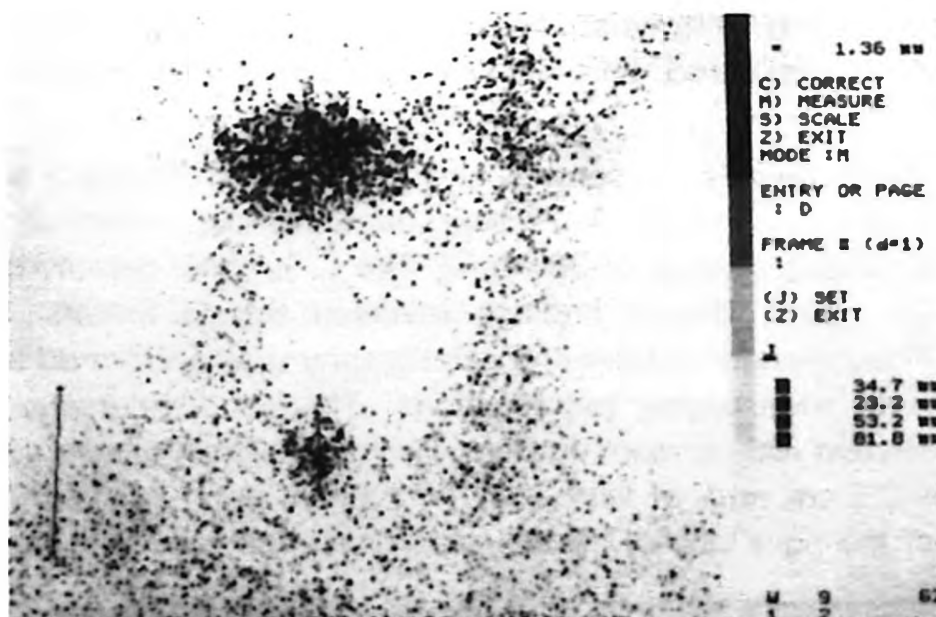


Fig. 2: ^{201}Tl - ^{99m}Tc subtraction scan: A focal area of increased activity is present below the right lobe of the thyroid demonstrating the adenoma. There is an area of increased uptake in the bone on the right half of the corpus mandibulae.



Fig. 3: Thallium bone scan: Focal areas of increased uptake on both parietal bones and right corpus mandibulae (left, upper), on both distal femur and proximal tibiae (right, upper), on both distal tibia and fifth metatarsal bone (left, lower), on the left wrist (right, lower).

Discussion

The sensitivity of localizing parathyroid adenomas using the thallium-technetium subtraction technique was reported by Blake et al⁵ to be 85 percent, and for hyperplasias 44 percent. Increased thallium uptake in the neck can also commonly be seen in thyroid carcinomas, thyroid adenomas, focal goitrous changes, Hashimoto's thyroiditis, rarely in neck metastasis, thyroid metastasis, lymphomas, sarcoidosis, and parathyroid carcinomas⁶. Correlation with ultrasonography and computerized tomography is necessary in order to eliminate false positive studies⁴.

^{99m}Tcnetium-MDP bone scans are found to be abnormal in 58 percent of hyperparathyroid patients⁷. As far as we know, thallium bone scanning is not performed in hyperparathyroid patients. Thallium acts as a potassium analog, and is known to have a tumor affinity, but the exact mechanism is unknown⁷. It has been observed that in bone lesions diagnosed as Brown tumors, there is an accumulation of thallium, as in the case of adenomas. After a search of the literature we did not find any reports of focal thallium accumulation in Brown tumors associated with hyperparathyroidism. Further investigation is necessary in order to elucidate this finding.

Summary

A case of parathyroid adenoma detected by ^{201}Tl - $^{99\text{m}}\text{Tc}$ subtraction scintigraphy is presented. Focal areas of thallium uptake were observed in the bone. Bone biopsy findings revealed Brown tumors associated with hyperparathyroidism.

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