

## Parallel hole versus pinhole collimator for technetium-99m sestamibi scintigraphy, in the diagnosis of parathyromatosis

**To the Editor:** I would like to present a case indicating that for the diagnosis of small lesions, it is better using a pinhole than a parallel hole collimator: A 32-year old woman, after having a kidney graft, gradually developed, secondary hyperparathyroidism (HPT) with serum parathyroid hormone (PTH), 954 pg/ml (normal values: 10-65 pg/ml) and serum calcium, 1200 mg/dl (normal < 10 mg/dl). Subtotal parathyroidectomy was successfully performed, however serum PTH level decreased temporarily. Recurrent HPT was diagnosed while serum PTH level reached 1230 pg/ml. The single tracer, single photon emission tomography (SPET) technique using a parallel hole collimator, revealed the presence of parathyroid tissue in the lower pole of the left thyroid lobe. The patient underwent a second operation after an unsuccessful conventional medical treatment. Histology revealed multiple nodules of parathyroid tissue within the removed specimen with the diagnosis of parathyromatosis (PT), moreover malignancy was excluded. Surprisingly, despite the extended resection, response was moderate and symptoms worsened.

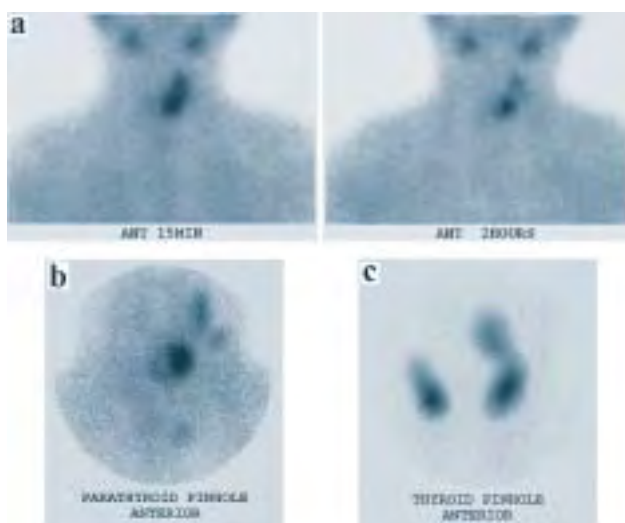
A technetium-99m methoxy-isobutyl isonitrile ( $^{99m}\text{Tc}$ -sestamibi) SPET scan of the thorax and neck, failed to reveal the source of excess PTH. A year later, a second  $^{99m}\text{Tc}$ -sestamibi SPET scan using also a parallel hole collimator, revealed an increased uptake of the radiotracer at the anatomical site of the left thyroid lobe. The additional use of a pinhole collimator at that time, showed multiple foci of increased uptake in the neck. Moreover, a thyroid SPET scan with  $^{99m}\text{Tc}$ -pertechnetate using a pinhole collimator was obtained to differentiate parathyroid from thyroid tissue. The areas of increased uptake of  $^{99m}\text{Tc}$ -sestamibi using the pinhole collimator were not corresponding to the  $^{99m}\text{Tc}$ -pertechnetate findings and the patient was diagnosed as having PT. PT is a rare cause of recurrent or persistent HPT after parathyroidectomy and remains a difficult diagnostic problem. No more than 20 cases have been described in the literature [1-3].

A variety of diagnostic procedures have been used to localize pre-operatively parathyroid glands and indicate their pathology. The accuracy of these procedures is verified after surgery. Although ultrasound has a sensitivity of 43%-75%, it plays a limited role in the evaluation of patients with persistent or recurrent HPT postoperatively [4]. Computed tomography is more effective in examining the mediastinum area [5, 6]. Magnetic resonance imaging has a reported sensitivity of 50%-93%, but is still under investigation [6, 7].

Radionuclide studies can indicate parathyroid pathology with high diagnostic accuracy, even when they are ectopically located. The application of  $^{99m}\text{Tc}$ -sestamibi has been widely accepted using either the double-phase protocol or the  $^{99m}\text{Tc}$ -sestamibi-thyroid imaging subtraction technique [8]. Pinhole collimator in such cases shows better efficiency and spatial resolution than parallel hole collimator. Its additional use after using the parallel hole collimator provides better visualization of nodular activity and improves detectability of parathyroid pathology [9, 10]. In our case the SPET scintiscan with  $^{99m}\text{Tc}$ -sestamibi and a pinhole collimator facilitated the correct diagnosis of PT.

### Bibliography

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**Figure 1** (a).  $^{99m}\text{Tc}$ -sestamibi SPET scintigraphy using parallel hole collimator. Increased uptake of the radiotracer at the anatomical site of the left lobe. (b)  $^{99m}\text{Tc}$ -sestamibi SPET scintigraphy using pinhole collimator. Multiple areas of increased uptake in the neck were revealed. (c)  $^{99m}\text{Tc}$ -pertechnetate thyroid SPET scintigraphy. Areas of increased uptake in the neck were seen. The location of these areas of increased uptake is different as compared to those seen in the  $^{99m}\text{Tc}$ -sestamibi pinhole scintigraphy (1b)

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