Reducing Unnecessary FNAC in Scintigraphically Hot Thyroid Nodules: A 10-Year Multicentre Retrospective Study

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Introduction

Thyroid scintigraphy and ultrasonography (USG) are commonly employed in the evaluation of thyrotoxicosis. While USG is not routinely indicated for evaluation of thyrotoxicosis, it plays a complementary role in assessment of thyroid blood flow using color Doppler imaging. Evidence has shown that sonographic features of scintigraphically hot nodules has limited value in malignancy stratification and may result in false positive findings. Nonetheless, fine needle aspiration cytology (FNAC) remains frequently performed for hot nodules with suspicious USG findings. It is important to recognize that FNAC carries its own limitations, including procedural risks, patient discomfort and potential over-treatment.

Objective

To evaluate the necessity of FNAC for scintigraphically hot thyroid nodules in thyrotoxicosis patients, irrespective of USG features.

Materials and Methods

A 10-year retrospective review (2014–2024) of 223 thyrotoxicosis patients who underwent thyroid scans (Tc-99m pertechnetate scintigraphy) across four centres in Hong Kong was conducted. Thyroid scan results and corresponding USG features (ACR TIRADS) were independently reviewed by two radiologists (thyroid scan κ=0.93; USG κ=0.75). FNAC results (Bethesda system), treatment modalities, and outcomes (surgical pathology or follow-up) were analysed.

Results

Inclusion and exclusion:

Total of 45 thyrotoxicosis cases with scintigraphically hot nodules and corresponding USG evaluation were included. Patient with no available USG images or no corresponding hot nodule detected on USG were excluded.

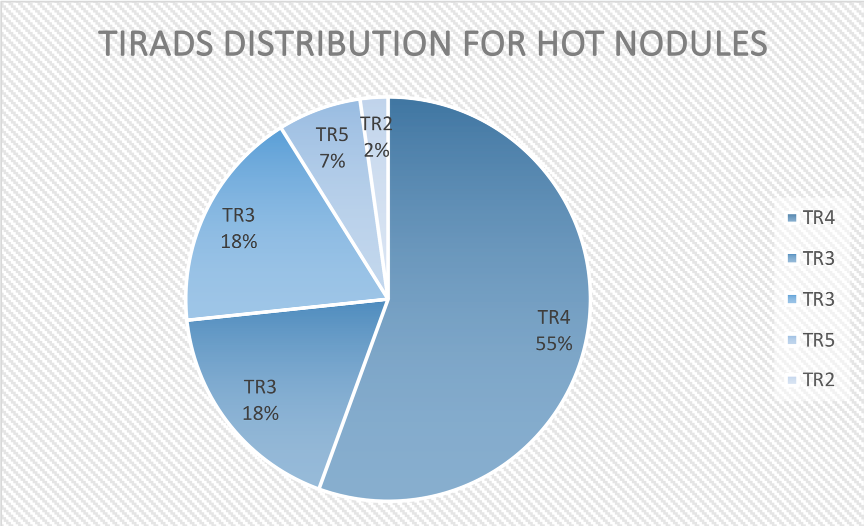
Total patients with thyroid scan n = 223 ⇨ Patients with hot nodule and USG evaluation n = 68 ⇨ Final study ground included for analysis n = 45

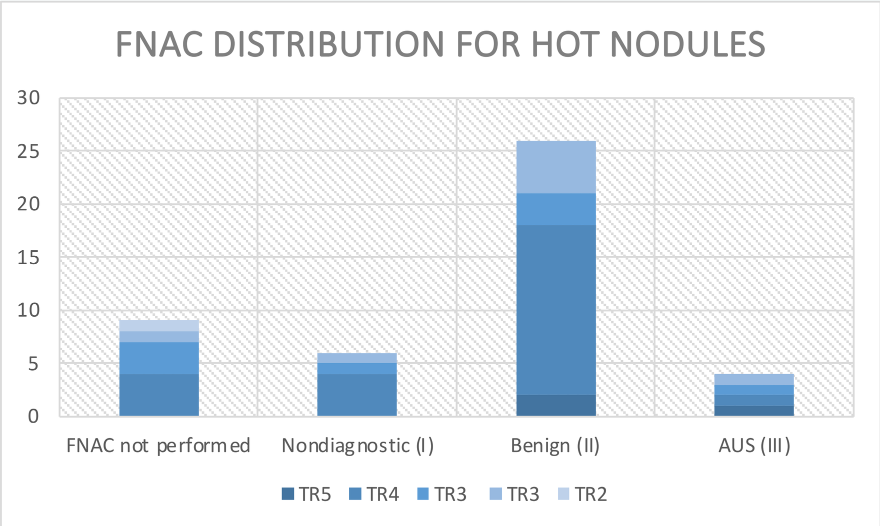
Excluded: No hot nodule or no USG performed n = 155

Excluded: hot nodule not detected on USG n = 23

TIRADS distribution and FNAC results:

USG classification revealed predominantly TR4 (25) and TR3 (16) nodules, with fewer TR5 (3) and TR2 (1). FNAC was performed in 36 cases (80%): 26 benign (Bethesda II), 6 non-diagnostic (I), and 4 atypia of undetermined significance (III).

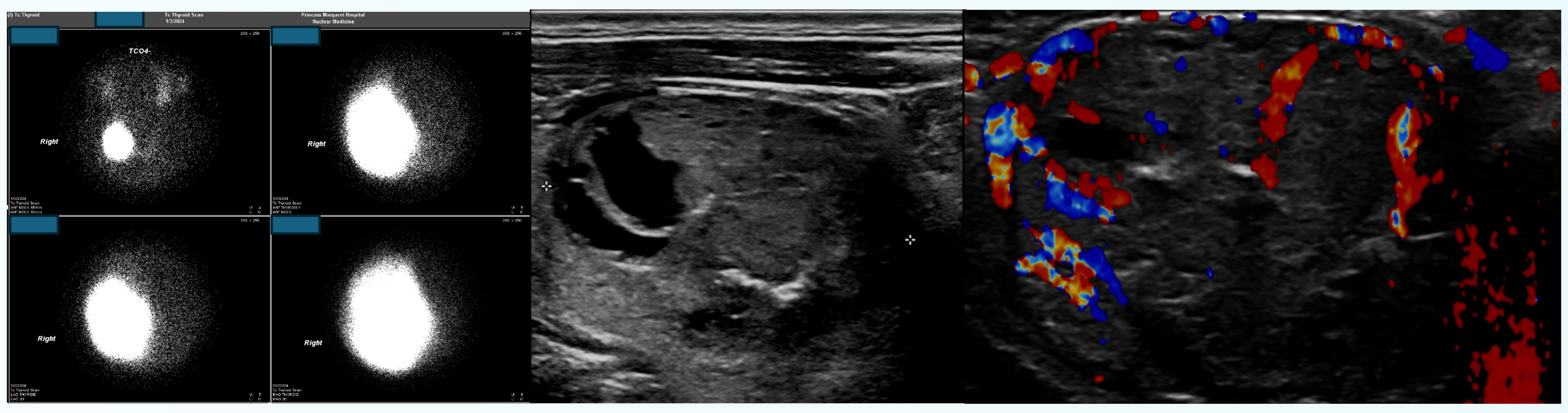




Treatment modality and outcome:

Treatment included anti-thyroid drugs (21), surgery (20), and radioactive iodine (4). All 20 surgically resected hot nodules were pathologically benign, including two Bethesda III cases. Three cases of incidental malignancies (1 papillary thyroid carcinoma, 2 papillary microcarcinoma) were anatomically distinct from the hot nodules. Among non-surgical cases, 21 exhibited stable USG features on follow-up; the remaining 4 were deemed benign via multidisciplinary consensus without further imaging. Overall, no malignancies arose from hot nodules.

Hot nodule with suspicious sonographic features:



Right lower pole hot nodule showing TIRADS 4 characteristics with increased vascularity. Repeated FNAC yields nondiagnostic results (Bethesda I). Thyroidectomy was performed and final pathology was benign.

Conclusion

Scintigraphically hot nodules harbored negligible malignancy rate, even among lesions with high TI-RADS scores. USG alone may overestimate malignancy risk in this context. FNAC may be avoidable for hot nodules, minimizing unnecessary patient burden, cost, and procedural risks.

Reference

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