ELSEVIER

Clinical Imaging 31 (2007) 109–113

CLINICAL IMAGING

Ultrasonographic findings of a newly detected nodule on the thyroid bed in postoperative patients for thyroid carcinoma: correlation with the results of ultrasonography-guided fine-needle aspiration biopsy

Jeong Hyun Lee[a,*], Ho Kyu Lee[b], Deok Hee Lee[a], Choong Gon Choi[a], Gyungyub Gong[c], Young Kee Shong[d], Sang Joon Kim[a]

[a]*Department of Radiology and Research Institute of Radiology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, South Korea*
[b]*Department of Radiology, University of Iowa Hospitals and Clinics, Iowa City, IA, USA*
[c]*Department of Pathology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, South Korea*
[d]*Department of Endocrinology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, South Korea*

Received 20 September 2006; accepted 20 November 2006

Abstract

We evaluated the ultrasonographic findings and performed ultrasonography-guided fine-needle aspiration biopsy of a newly detected nodule in the thyroid bed of 38 patients with postoperative thyroid carcinoma. Detection of a marginal irregularity, microcalcification, or a shape not parallel to the surrounding tissue plane might allow the identification of recurrent thyroid carcinoma from other benign pathologies mimicking local tumor recurrence.

Keywords: Thyroid cancer; Thyroidectomy; Ultrasonography; Aspiration biopsy; Fine-needle; Tumor recurrence

1. Introduction

Up to 20% of patients with differentiated thyroid carcinoma develop locoregional recurrences [1,2], and 8% of patients with local recurrences will eventually die of cancer [3]. The traditional follow-up tools for surveillance of neck recurrence after thyroidectomy include ^{131}I whole-body scan and measurement of serum thyroglobulin off 1-thyroxine (T4) therapy [3,4], or, more recently, after recombinant human thyroid-stimulating hormone (TSH) [1,5]. However, at least one fourth of the recurrences and metastases from differentiated thyroid cancer do not concentrate iodine [6], and false-negative thyroglobulin levels in patients with persistent disease have also been reported, although less frequently [7,8].

After routine clinical use of high-resolution ultrasonography (USG), the application of neck USG is now rapidly increasing as a first-line test during the follow-up of all patients with thyroid cancer [9]. On USG examination, the normal postoperative thyroid bed should have a uniform echogenic texture owing to fibrofatty connective tissue [10]. Literature reports state that any hypoechoic mass detected with high-frequency USG in the postoperative thyroid bed is suggestive of recurrence, and a biopsy should be performed, because tumor recurrence even from well-differentiated papillary thyroid carcinoma is associated with a significantly increased rate of thyroid cancer mortality [11,12]. However, there are several benign pathologies mimicking tumor recurrence in the thyroid bed, including remnant thyroid tissue, benign reactive lymph nodes, postoperative changes including suture granulomas [13], and the specific USG findings for the differential diagnosis

* Corresponding author. Department of Radiology, Asan Medical Center, University of Ulsan College of Medicine, 388-1 Poongnap-dong, Songpa-gu, Seoul 138-736, South Korea. Tel.: +82 2 3010 4352; fax: +82 2 476 0090.
E-mail address: jeonghlee@amc.seoul.kr (J.H. Lee).

0899-7071/07/$ – see front matter © 2007 Elsevier Inc. All rights reserved.
doi:10.1016/j.clinimag.2006.11.001

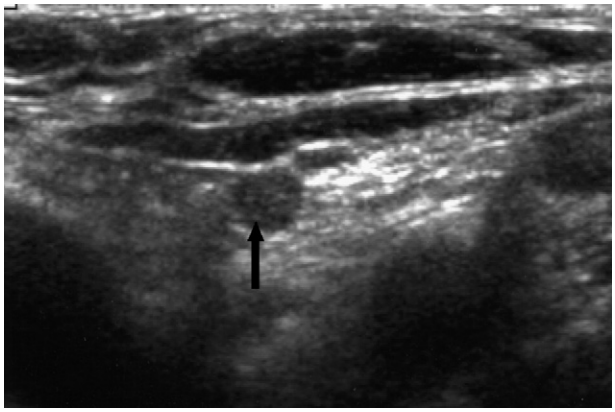

Fig. 1. Ultrasonograph of a 28-year-old woman who underwent total thyroidectomy for papillary thyroid carcinoma approximately 4 years ago. Ultrasonography examination demonstrates a hypoechoic nodule (maximum diameter, 4.4 mm) on her left thyroid bed. Despite the small size of the nodule, the margin is very discrete but is irregular with a serrated pattern. There are also multiple, dot-like internal echoes suggesting microcalcifications (arrow). This was diagnosed as local tumor recurrence on USG-FNAB and was also confirmed by surgery.

of tumor recurrence from those benign entities had not yet been reported.

The purpose of this study was to determine the USG findings of recurrent thyroid carcinoma on the thyroid bed and to differentiate them from benign pathologies mimicking tumor recurrence in patients with postoperative thyroid cancer.

2. Materials and methods

2.1. Patients

In this retrospective study, we enrolled 38 consecutive patients undergoing USG–fine-needle aspiration biopsy (FNAB) for a newly detected nodule after thyroidectomy for differentiated thyroid carcinoma (37 with papillary thyroid carcinoma and 1 with follicular carcinoma). A total of 40 nodules were evaluated in this analysis because 2 of the study patients had 2 lesions each on the thyroid bed. Surgical procedures for the study patients included total thyroidectomy in 30, subtotal thyroidectomy with radioactive iodine ablation using ^{131}I in 4, and lobectomy in 4 patients. Postoperative radioactive iodine ablation was also performed in all patients who had undergone total thyroidectomy. The mean patient age was 48 years (range, 13-74 years), and the mean follow-up duration from initial thyroid surgery to USG-FNAB was 5.3 years (range, 0.5-18 years). This study was approved by the institutional review board of our hospital.

2.2. Ultrasonography examination and USG-FNAB

Ultrasonography examination of the entire neck was performed on an HDI 3000 or 5000 scanner (Philips Medical Systems, Best, The Netherlands) using a 12.5-MHz linear phased-array transducer in all patients before the USG-FNAB procedure. Any hypoechoic abnormality visible in the thyroid bed on USG was investigated for the USG findings and was then aspirated under continuous real-time USG guidance. In all patients, USG-FNAB was performed by an experienced radiologist 1 to 3 times with a 21- or 23-gauge needle attached to a 10-mL plastic syringe, using a freehand technique.

2.3. Analysis of USG findings and statistics

Before analysis of the USG findings, the maximum diameters of the aspirated nodules were recorded. The USG findings of individual nodules were retrospectively evaluated for the presence of a marginal irregularity (in contrast to smooth configuration), microcalcification, a linear internal echo parallel to the surrounding tissue plane, an echogenic focus larger than a microcalcification, and a shape not parallel to the surrounding tissue plane (a taller than wide appearance) (Figs. 1–3). A marginal definition (ill-defined vs well-defined) and echogenicity compared with the surrounding strap muscles were also evaluated for each nodule.

The USG findings were compared with the cytological reports of USG-FNAB in all cases using the χ^2 test. We also calculated the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy for the individual USG findings. In addition, the maximum diameter of the aspirated nodules was evaluated for the probability of obtaining an adequate specimen for cytologic diagnosis using a statistical test. Statistical significance was accepted when the corresponding P value was less than .005.

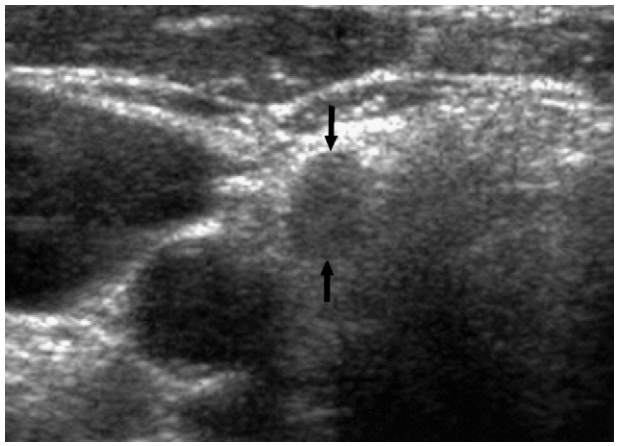

Fig. 2. Ultrasonograph of a 68-year-old woman who underwent total thyroidectomy for papillary thyroid carcinoma approximately 4 years ago. Ultrasonography examination shows a hypoechoic solid nodule (maximum diameter, 7.8 mm) on her right thyroid bed, which has a shape not parallel to the surrounding tissue plane (arrows). This was diagnosed as local tumor recurrence on USG-FNAB and was also confirmed by surgery.