Annals of Diagnostic Pathology 18 (2014) 177–180

Contents lists available at ScienceDirect

Annals of Diagnostic Pathology

Thyroid bed fine needle aspiration in patients after thyroidectomy—a useful follow-up tool with proposed diagnostic categories

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ARTICLE INFO

Keywords:
Thyroid
Thyroid bed
Fine needle aspiration

ABSTRACT

After thyroidectomy for primary thyroid malignancies, patients are closely monitored for recurrence or metastasis. Fine needle aspiration (FNA) has been used as the appropriate diagnostic modality for occult masses identified radiographically in the thyroid bed. In this study, we report our institutional experience with FNA of the thyroid bed and propose practical diagnostic categories. A retrospective chart review of all thyroid bed FNAs between April 2008 and January 2013 was performed, and a cohort of 39 patients was retrieved. The cytology diagnoses were divided into 5 categories including nondiagnostic, inflammatory/reactive, bland follicular cells, suspicious for neoplasm/malignancy, and malignant. The follow-up histologic and/or clinical findings were collected for each category. The 39 patients included 9 males and 30 females (ages 15-79 years). Prior thyroidectomies were due to papillary thyroid carcinoma (31 cases), follicular carcinoma (3 cases), medullary carcinoma (1 case), Hürthle cell carcinoma (1 case), malignancy unspecified (1 case), follicular adenoma (1 case), and multinodular goiter (1 case). Overall, 33% (13 cases) of thyroid bed FNAs were nondiagnostic, and 10% (4 cases) were categorized as "inflammatory/reactive." None of the patients in these 2 categories demonstrated evidence of clinical recurrence. One patient with a "bland follicular cells" thyroid bed FNA diagnosis had metastatic papillary thyroid carcinoma on follow-up histology. Of 14 patients in the "suspicious" and "malignant" categories, 10 had malignant follow-up diagnosis on histology. In conclusion, thyroid bed FNA with standardized diagnostic categories is a useful modality for follow-up in patients who have undergone thyroidectomy.

1. Introduction

It is estimated that there were 60 220 new cases of thyroid cancer in the United States in 2013, with an estimated 1850 deaths [1,2]. The mainstay of initial management of differentiated thyroid cancer (papillary, follicular, or Hürthle cell) is surgical removal of the tumor. Complete resection of tumor is associated with decreased disease recurrence, reduced likelihood of metastatic spread, and improvement in overall outcome [3-6]. A second important initial treatment is postoperative radioactive iodine therapy (RAI). This may be used as a multipurpose tool depending upon the individual risk factors of the patient [7]. For the purposes of disease therapy, RAI functions either to treat known persistent disease or acts as an adjuvant therapy to destroy possible undetectable metastatic disease. In addition, RAI is used for remnant ablation in anticipation of long-term surveillance. Remnant ablation eliminates any residual normal thyroid tissue that may interfere with RAI whole-body scanning and/or serum thyroglobulin monitoring. For these reasons, total or near-total thyroidectomy is the front-line therapy for differentiated thyroid cancer.

After initial therapy, these patients are closely monitored for recurrence or metastasis. Routinely used surveillance modalities for this patient population include regular physical examinations with palpation of the neck, high-frequency ultrasound (US), chest radiography, whole-body iodine-131 scintigraphy, laboratory monitoring of pertinent tumor markers (serial and/or stimulated thyroglobulin levels for papillary or follicular carcinomas and calcitonin and carcinoembryonic antigen levels for medullary carcinoma), and stimulated thyroglobulin levels [8]. In this realm, high-frequency US has arguably proven its superiority in sensitivity compared with the other surveillance modalities and is therefore commonly used for this purpose [9,10]. However, a drawback of imaging techniques is that the specificity can be hampered by disease recurrence mimics such as therapy-induced tissue changes as well as residual or regenerated thyroid tissue. Therefore, tissue confirmation is required for appropriate triage of either palpable masses or nonpalpable occult masses identified radiographically in the thyroid bed before a safe and effective reoperative thyroid bed surgery [11].

Recently published reports indicate a high positive predictive value of disease recurrence in US-guided fine needle aspirations

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http://dx.doi.org/10.1016/j.anndiagpath.2014.03.003
1092-9134/

(FNA) of the thyroid bed [12-14]. In addition, these reports advocate cautious interpretation of thyroid bed FNAs due to the difficulties in interpreting the cytologic specimens. These difficulties are induced by therapy-related cellular and tissue changes as well as overall paucity of cellular material obtained secondary to the appropriate therapy. Therefore, it is proposed that these specimens have a high nondiagnostic rate. However, in cases with true recurrence, diagnostic tissue may be more easily obtained and identified. In addition, due to the variability of specimen quality from this site, it is noted that interpretation and the wording of cytologic report is likely highly variable. Such variability in reporting may lead to confusion or uncertainty regarding the appropriate management of these patients. To add strength to the published data, we performed a retrospective study of thyroid bed US-guided FNAs at our institution from April 2008 to January 2013. We also propose diagnostic categories for these cytologic specimens to aid in standardization of reporting and the subsequent follow-up and management of these patients.

2. Materials and methods

2.1. Cases

All specimens at our institution designated as "thyroid bed" FNA during the period of April 2008 to January 2013 were identified, and the reports were reviewed. A cohort of 39 patients (48 specimens) was identified. Clinical information including age, sex, diagnosis on previous thyroidectomy specimen, and clinical follow-up was collected. The cases were divided into 5 diagnostic categories including "nondiagnostic," "inflammatory/reactive," "bland follicular cells," "suspicious for malignancy/neoplasm," and "malignant." The cases were called "nondiagnostic" when the specimen was acellular; "inflammatory/reactive" when it was composed of inflammatory cells, foreign body giant cells, and fat necrosis; "bland follicular cells" when small groups of follicular cells were seen with no cytologic atypia; "suspicious for malignancy" when incomplete cellular features of malignancy were identified or scant cells that are quantitatively insufficient for a definitive diagnosis; and "malignant" when there was sufficient cytologic features for a definitive diagnosis (Fig. 1).

The protocol of this study was approved by the University of Kansas Cancer Center Protocol Review and Monitoring Committee and by our institution's board of human subjects research.

2.2. Histologic data collection

The cytologic diagnoses were then compared with the clinical follow-up and subsequent histologic diagnosis if surgery was performed.

3. Results

All of the samples were collected via radiologically guided FNA procedure. The patients' age ranged from 15 to 79 years (mean, 52.5 years) and included 30 females and 9 males. The diagnoses reported in the previous thyroidectomy specimens included 31 cases of papillary thyroid carcinoma, 3 cases of follicular carcinoma, and 1 case each of medullary carcinoma, Hürthle cell carcinoma, malignancy unspecified, follicular adenoma, and multinodular goiter. The thyroid bed FNA diagnosis and follow-up data are shown in Table 1. Overall, 33% (13 cases) of thyroid bed FNAs were nondiagnostic. In addition, 10% (4 cases) were categorized as "inflammatory/reactive." None of the patients with a cytologic diagnosis of "nondiagnostic" or "inflammatory/reactive" demonstrated evidence of clinical recurrence or progression, although 2 patients with an "inflammatory/reactive" diagnosis on FNA were lost to follow-up. Subsequent surgery was performed on 2 of the "nondiagnostic" cases, without histologic evidence of recurrent disease. Of the 4 cases categorized as "bland follicular cells," 1 (25%) had follow-up surgery due to the findings of extensive lesions clinically. This case did prove to be recurrent papillary thyroid carcinoma on surgical pathology specimens and will be discussed later.

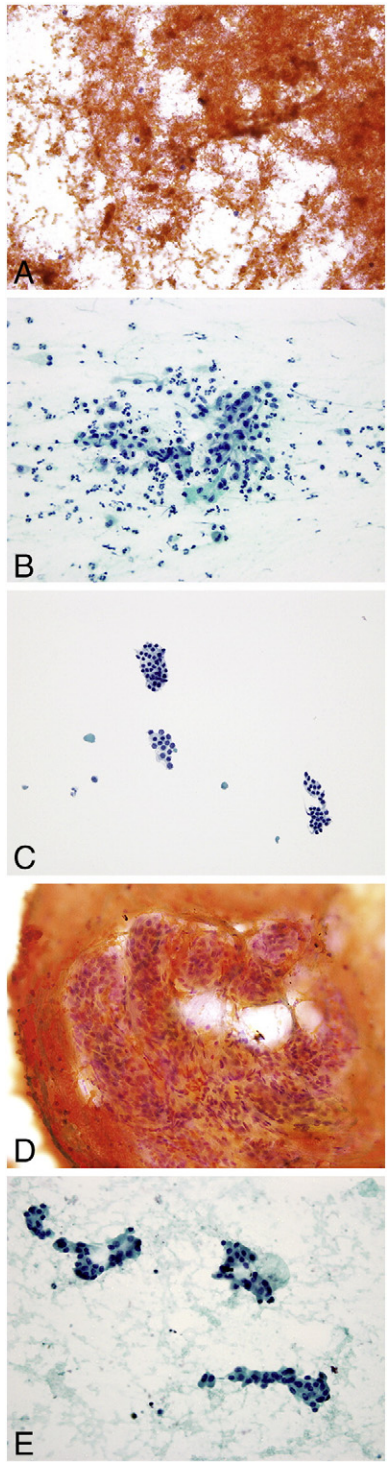

Fig. 1. The proposed 5 diagnostic categories for thyroid bed FNA. (A) Nondiagnostic. The specimen is bloody and acellular (Papanicolaou [Pap] stain, ×400). (B) Inflammatory/reactive. The smear shows collections of inflammatory cells and histiocytes consistent with previous surgery site (thyroid bed) (Pap stain, ×400). (C) Bland follicular cells. The smear contains a few groups of bland follicular cells in a flat sheet arrangement. The cells are small without atypical features (Pap stain, ×400). (D) Suspicious for neoplasm/malignancy. One group of follicular cells is trapped in blood clot. It has a papillary-like structure. The nuclear detail is difficult to visualize (Pap stain, ×400). (E) Malignant. The cells have enlarged nuclei, irregular nuclear membrane, longitudinal nuclear grooves, fine nuclear chromatin, and rare intranuclear pseudoinclusion, findings diagnostic of papillary thyroid carcinoma (Pap stain, ×400).