metastases in any lymph nodes, organs or recurrent tumor at the sites of their original cancers. The fifth patient had no remarkable past medical history. In all cases, the thyroid nodules were aspirated with a 22-gauge, 4.5-cm-long needle connected to a 10-ml plastic syringe. Direct smears prepared from the needle aspirates were fixed in 95% ethanol and stained by the Papanicolaou technique. In 3 cases, a Papanicolaou-stained cellular smear was stained with a commercial thyroglobulin antibody using the avidin-biotin-complex (ABC) technique without prior destaining with an ethanol-acetic acid solution. In 1 case, an ethanol-fixed cellular smear was stained with a commercial HMB-45 antibody by the same technique. The patients' thyroid lesions were removed by lobectomy. Representative tumor tissue samples from the resected thyroid lobes were processed according to the routine method for histologic study. In one case, 5-micron-thick tissue sections from a representative tumor tissue block were stained with thyroglobulin and HMB-45 antibodies by the ABC technique.

Results

The clinicopathological data of our 5 patients are tabulated in Table 1. All patients subsequently received chemotherapy and died of metastatic cancer from 27 to 40 months after their thyroid surgeries.

Cytologic and immunocytochemical findings

In all five cases, the thyroid needle aspirates revealed abundant malignant cells admixed with a small number of benign follicular epithelial cells. Sheets of non-keratinizing malignant squamous cells admixed with isolated keratinizing malignant squamous cells were present in the thyroid needle aspirate of patient 1, indicating a moderately differentiated squamous cell carcinoma (Figure 1). The thyroid tumor in this patient was most likely a metastatic neoplasm, as the cytologic finding in his thyroid FNA was similar to that of the needle aspirate of his previously resected bronchogenic squamous cell carcinoma. Patient 2 showed in her thyroid FNA small malignant cells with scant cytoplasm and small, oval hyperchromatic nuclei wrapping around round basophilic globules, characteristic for a metastatic adenoid cystic carcinoma. A few round basophilic bodies were also present (Figures 2 and 3). The cytologic findings in this patient were similar to those of the needle aspirate from her previously resected parotid adenoid cystic carcinoma. In patient 3 with a previously resected renal cell carcinoma (RCC), the thyroid FNA revealed irregular large, monolayered sheets of malignant epithelial cells with granular and clear cytoplasm, suggesting a metastatic RCC, clear cell type (Figure 4). However, a thyroid Hurthle cell carcinoma was not ruled out with certainty. The tumor cells in this patient stained negatively with thyroglobulin antibody and further confirmed that the patient's lesion was a metastatic RCC. Patient 4 who had a previously resected scalp melanoma yielded in his thyroid FNA revealed several single and loosely clustered malignant large polygonal cells with oval nuclei, conspicuous nucleoli and abundant, granular cytoplasm without intracytoplasmic melanin pigment granules, suggesting a metastatic amelanotic melanoma (Figure 5). However, a Hurthle cell or anaplastic carcinoma of the thyroid was not ruled out with confidence on cytologic basis alone. Two cellular smears from this patient were stained with thyroglobulin and HMB-45 antibodies. The tumor cell cytoplasm reacted negatively with thyroglobulin and positively with HMB-45 antibodies (Figure 6). The immunocytochemical results in this case indicated a metastatic amelanotic melanoma to the thyroid. In patient 5, the thyroid FNA revealed large, mon-

Table 1: Clinicopathological Data of Five Patients with Solitary Metastatic Carcinomas to the Thyroid*

Patient	Age/Sex	Clinical Data	Cytodiagnosis	Histodiagnosis	Follow-up Data
1	37/Male	3-cm right STN. Squamous cell carcinoma, upper lobe of right lung removed by lobectomy 8 mos prior	Met. squamous cell carcinoma	Met. squamous cell carcinoma	DWD 27 mos after TS
2	60/Female	3.5-cm left STN Adenoid cystic carcinoma of left parotid removed by radical surgery 2 yrs prior	Met. adenoid cystic carcinoma	Met. adenoid cystic carcinoma	DWD 36 mos after TS
3	48/Male	3-cm right STN RCC of right kidney removed by radical nephrectomy 1 yr prior	Met. RCC, CT	Met. RCC, CT	DWD 38 mos after TS
4	70/Male	4-cm right STN Scalp melanoma treated by wide surgical resection 4 yrs prior	Met. amelanotic melanoma	Met. amelanotic melanoma	DWD 29 mos after TS
5	57/Female	3.4-cm left STN No history of cancer	Met. RCC, CT	Met. RCC, CT	Occult RCC of right kidney detected. DWD 40 mos after TS.

* STN, solitary thyroid nodule; Met, metastatic; DWD, died with metastatic disease; TS, thyroid surgery; RCC, CT, Renal cell carcinoma, clear cell type