Papillary thyroid carcinoma metastasis most probably due to fine needle aspiration biopsy. A case report

D. Tamiolakis, C. Antoniou, J. Venizelos, M. Lambropoulou, G. Alexiadis, C. Ekonomou, N. Tsiminikakis, E. Alifieris, N. Papadopoulos, Th. Konstandinidis, and C. Kouskoukis

SUMMARY

Implantation of cancer cells from needle biopsy has been reported in a wide range of malignancies. Fine needle aspiration biopsy has become an accepted method for assessment of thyroid nodules. Local reappearance of thyroid cancer from needle track dissemination is a rare complication of thyroid aspiration.

A 45-year-old female developed local recurrence of papillary thyroid carcinoma four years after aspiration biopsy and thyroidectomy. Metastatic deposits appeared in the skin and the sternocleidomastoid muscle. The linear array and the site of metastases implied that seeding most probably resulted from the needle biopsy.

KEY WORDS

thyroid, carcinoma, needle, biopsy, metastasis, local

Introduction

Fine needle aspiration biopsy (FNAB) has replaced the radionuclide thyroid scan and ultrasound as the first-line test in the appraisal of thyroid nodules in euthyroid subjects (1, 2). The application of ultrasound-guided FNAB has become a helpful method for obtaining material for cytological diagnosis of thyroid tumors in addition to palpation-guided FNAB (3, 4). Thyroid FNAB is an adequate assay for the diagnosis of thyroid cancer, although false negative and false positive rates are estimated at 4% and 2%, respectively (1, 5). In the case of papillary thyroid cancer, the overall accuracy of FNAB is 97% (5, 6). The accuracy of thyroid FNAB has reduced the number of thyroidectomies (1, 7). Cancer dissemination along the needle track resulting from FNAB is a hazard in many tumor types. There are reports of hepatocellular, pancreatic, prostatic, and lung cancer seeding provoked by needle biopsy (8). FNAB has been commonly practiced for thyroid lesions. However, dissemination of thyroid cancer after needle aspiration has been rarely reported. We report a case of local relapse of papillary thyroid carcinoma in a female that presented with cutaneous and muscle seeding obviously resulting from a needle puncture.

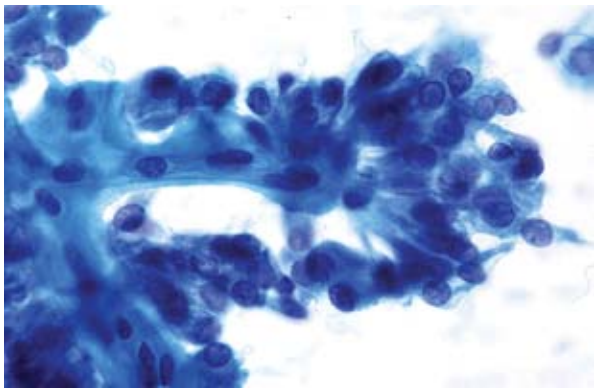

Figure 1. Aspiration cytology. Smear of relapsed Papillary Thyroid Carcinoma in the dermis showing aggregates of neoplastic cells with anisokaryosis and loss of orientation. Diff-Quik stain x 200.

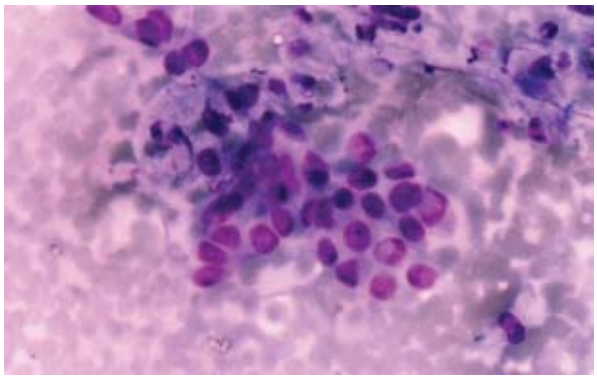

Figure 2. Aspiration cytology. Smear of relapsed Papillary Thyroid Carcinoma in the dermis showing neoplastic cells with papillary formation. Diff-Quik stain x 200.

Case report

A 45-year-old female presented with relapsing papillary thyroid carcinoma arising in the skin and sternocleidomastoid muscle. She had a long-standing history of hypothyroidism and had developed a palpable mass in the right thyroid lobe five years previously. The nodule showed no activity on a thyroid scan. The patient refused further investigation at that time, but one year later underwent an ultrasound-guided FNAB. The nodule in the lower pole of the right thyroid lobe was aspirated with a single pass using a 22-gauge needle. It measured 2.5 × 1.5 × 2 cm. Cytology indicated a papillary thyroid carcinoma. The patient underwent a total thyroidectomy and

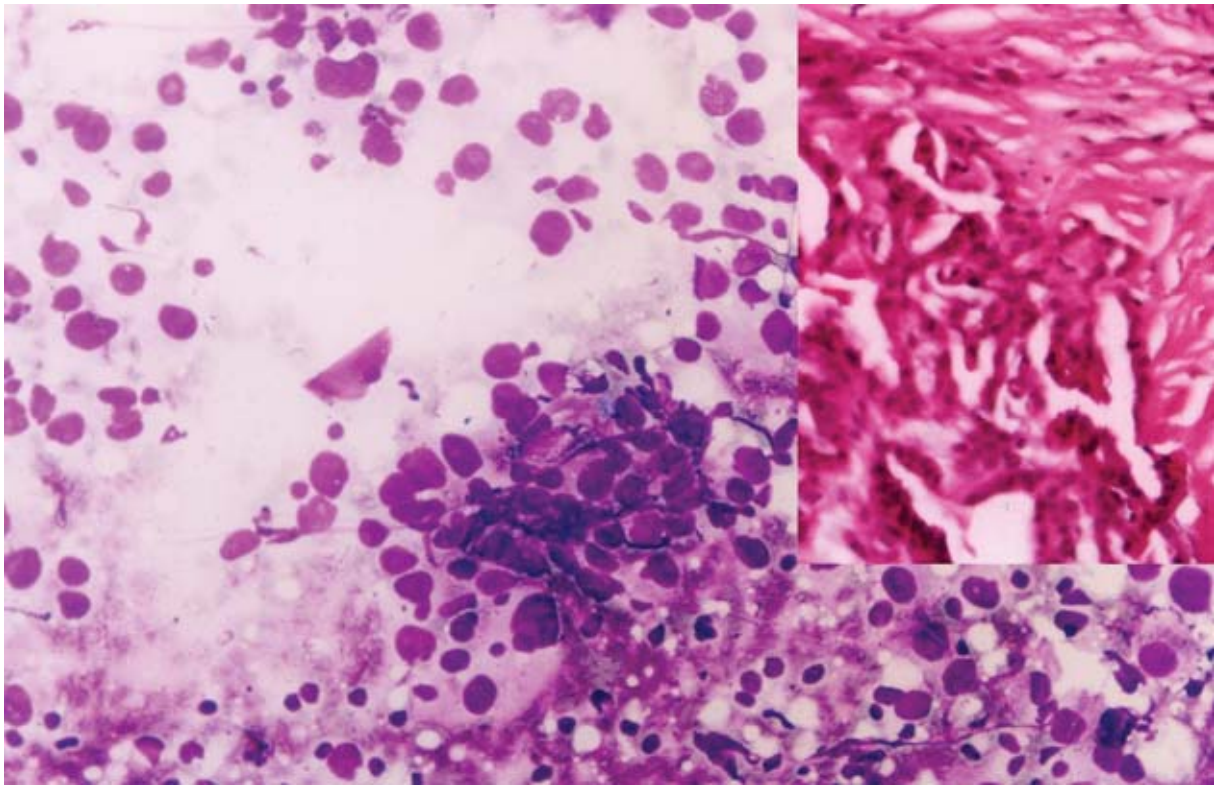

Figure 3. Aspiration cytology. Smear of relapsed Papillary Thyroid Carcinoma in the dermis showing dispersed and clustered neoplastic cells. (Diff-Quik stain X 200).
Insert, histology: recurrent Papillary Thyroid Carcinoma in the dermis showing papillary architecture. Hematoxylin-Eosin stain x 100.

a right mid-neck lymph-node dissection. A segment of the strap muscle was completely excised because the nodule had adhered to the muscle. Histopathology revealed papillary thyroid carcinoma with one of four lymph nodes invaded by metastases. She was treated with radioactive iodine and was reevaluated one year later: physical examination was normal, thyroglobulin was undetectable, and there was no abnormal uptake on an iodine scan with recombinant human TSH.

Four months prior to the current presentation, the patient observed a new lesion on the skin of the right side of the neck. On clinical examination, a non-pigmented nodule of about 3.5 mm in diameter was found. In addition, a mass adherent to the muscle at the right side of the neck just below the skin lesion was observed. Her TSH level was 3.90 ng/dl and thyroglobulin was undetectable. Ultrasound investigation confirmed a 2.8 × 1.5 cm lobulated mass within the right sternocleidomastoid muscle, which was aspirated with three passes of a 25-gauge needle. Cytology showed metastatic papillary thyroid cancer, and the patient was referred for surgery. Both the skin lesion and the muscle mass were excised and were routinely processed for pathological examination. Histopathology revealed metastases of papillary thyroid carcinoma in both the skin and muscle. The linear array of the tumors in the skin and in the muscle was highly suggestive of needle track dissemination.

Results

Cytological findings (Figures 1–3): FNAB smears showed monolayered cell sheets and papillary fronds. The cells were polygonal, with well-defined margins. The nuclei were of varying size containing coarse chromatin and inconspicuous nucleoli, but no mitotic figures. Multinucleated giant cells with abundant cytoplasm were also noted. Sharply demarcated, spherical cytoplasmic inclusions, septate cytoplasmic vacuoles, and foamy macrophages were also present. No psammoma bodies were found.

Pathological findings (Figure 3: insert): Recurrent tumor in dermis and muscle demonstrated a predominantly papillary pattern, usually complex, branching, and randomly oriented. Nuclear features included apparent ground glass, often large and overlapping nuclei, pseudoinclusions appearing as sharply outlined acidophilic formations, and grooves.

Discussion

Our case most probably represented a dissemination of papillary thyroid carcinoma four years after the FNAB thyroidectomy. This hypothesis is supported by the following observations: (i) the cutaneous deposits corresponded to the entry site of the needle biopsy; (ii) the muscle seeding was uncommon and suggested dissemination from either the FNAB or the surgical procedure. There was no evidence that the surgical procedure disrupted the internal layers of the sternocleidomastoid; (iii) the linear relationship between the cutaneous metastases and the muscle implant is strongly suggestive of needle track dissemination of tumor cells (9).

The incidence of dissemination through a needle biopsy has been reported in 0.003–0.009% of all FNABs (10). Most reported cases include pancreatic, hepatocellular, or prostatic cancer, or mesothelioma cells (10). Other reported types of cancer are retinoblastoma, sarcomas, thymoma, and melanoma (11–14). Several cases of thyroid cancer dissemination after FNAB have also been described (15–20). The potential for needle track seeding has been associated with several parameters, such as the diameter of the needle, the number of passes, withdrawal of the needle without releasing suction, and injecting the tumor at the time of biopsy (8). The current recommendation for thyroid FNAB is to use a 23-gauge or smaller needle (21), and to release suction before withdrawing the needle. The number of passes varies from 1 to 10 or more. The incidence of dissemination of thyroid carcinoma along a needle track is rare and is less frequent than in abdominal and pelvic tumors. In our setting, FNAB was performed by a single pass of a 22-gauge needle and there were no apparent circumstances that explain the complication.

REFERENCES

1. Mazzaferri EL. Management of a solitary thyroid nodule. N Engl J Med 1993; 328: 553–9.

2. Sabel MS, Staren ED, Gianakakis LM, Dwarakanathan S, Prinz RA. Effectiveness of the thyroid scan in evaluation of the solitary thyroid nodule. Am Surgeon 1997; 63: 660–4.

3. Carmeci C, Jeffrey RB, McDougall IR, Nowels KW, Weigel RJ. Ultrasound-guided fine-needle aspiration biopsy of thyroid masses. Thyroid 1998; 8: 283–9.

4. Rausch P, Nowels K, Jeffrey RB. Ultrasonographically guided thyroid biopsy: A review with emphasis on technique. J Ultrasound Med 2001; 20: 79–85.

5. Agrawal S: Diagnostic accuracy and role of fine needle aspiration cytology in management of thyroid nodules. J Surg Oncol 1995; 58: 168–72.

6. Ravetto C, Colombo L, Dottorini ME. Usefulness of fine needle aspiration in the diagnosis of thyroid carcinoma: A retrospective study in 37,895 patients. Cancer 2000; 90: 357–63.

7. Gharib H, Goellner JR. Fine-needle aspiration biopsy of the thyroid: An appraisal. Ann Intern Med 1993; 118: 282–9.

8. DeMay RM. The art and science of cytopathology. Chicago: American Society of Clinical Pathologists Press; 1995.

9. Mighell AJ, High AS. Histological identification of carcinoma in 21 gauge needle tracks after fine needle aspiration biopsy of head and neck carcinoma. J Clin Pathol 1998; 51: 241–52.

10. Smith EH. Complications of percutaneous abdominal fine needle biopsy: Review. Radiology 1991; 178: 253–8.

11. Karcioglu ZA. Tumor seeding in ocular fine needle aspiration biopsy. Ophthalmology 1985; 92: 1763–7.

12. Davies NM, Livesley PJ, Cannon SR. Recurrence of an osteosarcoma in a needle biopsy track. J Bone Joint Surg Br 1993; 75: 977–8.

13. Nagasaka T, Nakashima N, Nunome H. Needle tract implantation of thymoma after transthoracic needle biopsy. J Clin Pathol 1993; 46: 278–9.

14. Shah JN, Fraker D, Guerry D, Feldman M, Kochman ML. Melanoma seeding of an EUS-guided fine needle track. Gastrointest Endosc 2004; 59(7): 923–4.

15. Panunzi C, Paliotta DS, Papini E. Cutaneous seeding of a follicular thyroid cancer after fine needle aspiration. Diagn Cytopathol 1994; 10: 156–8.

16. Wang C, Vickery ALJ, Maloof F. Needle biopsy of the thyroid. Surg Gynecol Obstet 1976; 143: 365–8.

17. Block MA, Miller JM, Kini SR. The potential impact of needle biopsy on surgery for thyroid nodules. World J Surg 1980; 4: 737–41.

18. Crile G. The danger of surgical dissemination of papillary carcinoma of the thyroid. Surg Gynecol Obstet 1956; 102: 161–3.

19. Hales MS, Hsu FS. Needle tract implantation of papillary carcinoma of the thyroid following aspiration biopsy. Acta Cytol 1990; 345: 801–4.

20. Karwowski JK, Nowels KW, McDougall IR, Weigel RJ. Needle track seeding of papillary thyroid carcinoma from fine needle aspiration biopsy. A case report. Acta Cytol 2002; 46(3): 591–5.

21. The Papanicolaou Society of Cytopathology task force on standards of practice. Guidelines of the Papanicolaou Society of Cytopathology for the examination of fine needle aspiration specimens from thyroid nodules. Mod Pathol 1996; 9: 710–5.

AUTHORS' ADDRESSES

Demetrio Tamiolakis, MD, Resident B, Department of Cytology, Regional Hospital of Chania, Crete, Greece
Chara Antoniou, MD, Resident A, Second Department of Surgery, same address
John Venizelos, MD, Associate Director, Department of Pathology, Ippokration Hospital of Salonica, Greece
Maria Lambropoulou, MD, Lecturer, Department of Histology-Embryology, Democritus University of Thrace, Medical School, Alexandroupolis, Greece.
George Alexiadis, MD, Radiodiagnostic Center of Alexandroupolis, Greece.
Constantine Economou, MD, Resident A, Second Department of Surgery, Regional Hospital of Chania, Crete, Greece
Nikolaos Tsiminikakis, MD, Resident B, Second Department of Surgery, same address
Emmanouel Alifieris, MD, Director, Second Department of Surgery, same address
Nikolaos Papadopoulos, MD, Associate Professor, Department of Histology-Embryology, Democritus University of Thrace, Medical School, Alexandroupolis, Greece, corresponding author, e-mail: npapad@med.duth.gr
Theodoros Konstandinidis, MD, Lecturer, Democritus University of Thrace, Medical School, same address
Constantine Kouskoukis, Professor, Democritus University of Thrace, Medical School, same address