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Papillary Carcinoma of the Breast in a Male Patient With a Treated Prostatic Carcinoma Diagnosed by Fine-Needle Aspiration Biopsy: A Case Report and Review of the Literature

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Abstract

Papillary carcinoma of the male breast is very rare. In this case report, we describe the cytologic, histologic, immunohistochemical, and radiological findings of a papillary carcinoma of male breast. A 67-yr-old man, who had a previous history of prostatic adenocarcinoma, presented with a retroareolar painless mass. There was no known history of breast cancer in his family. A fine-needle aspiration biopsy (FNAB) was performed. Cytological examination revealed a cellular aspirate with three-dimensional papillary clusters. A diagnosis of papillary lesion favoring papillary carcinoma was rendered. Immunohistochemical staining of the cell-block of the FNAB revealed the presence of mammaglobin, and the absence of prostatic specific antigen. The patient underwent lumpectomy, which showed a moderately differentiated infiltrating papillary carcinoma with adjacent areas of ductal carcinoma in situ. FNAB is a useful technique in identifying male breast carcinoma. In conjunction with ancillary studies, this procedure can effectively differentiate between a primary versus metastatic lesion.

Keywords

male breast malignant tumor; papillary carcinoma; prostatic carcinoma; mammaglobin

Male breast carcinoma compared with the female counterpart is infrequent.¹ Papillary carcinoma of the male breast is very rare and accounts for less than 1% of all male breast carcinomas.^{2–4} The differential diagnosis of benign and malignant lesions of papillary breast lesions can be problematic not only cytologically but also histopathologically. Clues favoring papillary carcinoma on cytological samples include abundant cellular material, three-dimensional papillary clusters without fibrovascular connective cores, small papillae arranged in cell balls, tall columnar cells, isolated naked nuclei, and numerous hemosiderinladen macrophages.^{5,6} The lack of bipolar naked nuclei and apocrine metaplasia also favor malignancy. On the other hand, benign papillary lesions (Papillomas) exhibit less material, the papillae have cohesive stalks surrounded by columnar cells in a honeycomb pattern, and fewer small papillae and isolated columnar cells are seen. In addition, apocrine metaplasia and bipolar naked nuclei are usually identified.^{5–7} Only a few cases of papillary carcinoma of the male breast diagnosed by fine-needle aspiration biopsy (FNAB) have been reported.^{1–5} In this case report, we describe the cytologic, histologic, immunohistochemical, and radiological findings of a papillary carcinoma of male breast.

Case Reports

A 67-yr-old African American man who had a previous history of prostatic carcinoma status post hormonal and radiation therapy presented with a history of painless retroareolar right breast mass, which the patient noticed after falling on a handle of a shovel, approximately six months prior to presentation. There was no history of breast cancer in his family. The patient had no nipple retraction, discharge, or bleeding. There was no ulceration of the overlying skin, nor were palpable axillary lymph nodes observed. Physical examination revealed a $1 \times 0.5 \text{ cm}^2$ retroareolar nodular mass. Mammogram showed a mass in the subareolar portion of the right breast (Fig. 1). Ultrasound imaging was recommended and revealed a 0.9-cm well-demarcated solid hypoechoic mass. FNAB of the lesion using a 23-gauge needle was performed. Diff-quick and Papanicolaou stained smears, cytospin as well as cell-blocks, were prepared from the aspirated specimen.

Cytological examination revealed a cellular aspirate, three-dimensional papillary clusters with fine or no fibro-vascular connective cores, small papillae arranged in cell balls with tall columnar cells, and isolated naked nuclei (Figs. 2–4). Neoplastic cells with large prominent nucleoli, and a few mitoses were also identified in the cell-block (Fig. 5). A cytological diagnosis of papillary lesion favoring papillary carcinoma was rendered. Surgical excision was recommended. The excised specimen measured $2 \times 1.5 \text{ cm}$ and showed a 1 cm moderately differentiated invasive papillary carcinoma with adjacent areas of ductal carcinoma in situ with solid and cribriform pattern (Figs. 8 and 9). Mitotic figures and areas of necrosis were also identified. There were no psammoma bodies present. Immunohistochemical stains for prostatic specific antigen (PSA) and prostate specific acid phosphatase (PSAP) (Dako Carpinteria, CA) on the cell-block of the FNAB, as well the excisional biopsy, were negative (Figs. 6 and 10), which excluded a prostatic origin for the tumor cells. Conversely, positive staining for mammaglobin (Cell Marque Hot Springs, AR), a protein expressed exclusively in the breast,⁸ suggested a mammary ductal epithelial origin for the lesion (Figs. 7 and 11). Additional analyses on the tissue blocks revealed positive staining for estrogen receptor, progesterone receptor, HER-2 NEU and Ki 67, and negative staining for P53 (Dako). DNA ploidy studies showed an aneuploid cell population with a DNA index of 1.2.

Discussion

Papillary carcinoma of the male breast is a very rare disease, accounting for less than 1% of all male breast carcinomas. Only a few cases have been reported in the literature.^{1–6} Even fewer cases are reported where the initial diagnosis was made by FNAB.^{5,6} The distinction between benign and malignant papillary lesions is always difficult, as it has been reported in the literature for papillary neoplasms developing in women and has long been a source of controversy. Kraus and Neubecker⁹ tabulated a criterion for distinguishing benign from malignant papillary lesion based on the analysis of the epithelium covering the papillae. Azzopardi explained these criteria in more detail later. According to these criteria, the benign lesions have a typical dual layer of the mammary epithelium, consisting of luminal secretory epithelial cells and of basal myoepithelial cells. Malignant transformation should and does result in the loss of such dual differentiation.^{10,11} The use of immunohistochemistry with smooth muscle actin (SMA), Calponin, and p63 has been identified as a reliable means of identifying the presence of a myoepithelial cell layer to differentiate between benign and malignant papillary lesions.¹²

Utilizing FNAB in diagnosing papillary lesions has been a focus of many studies,^{13,14} and attempts have been made to present reliable diagnostic criteria using the combination of cytologic features, immunohistochemical staining, and radiographic findings. FNAB for

diagnosing papillary lesions are evaluated on the basis of cellularity, architectural pattern in cell groups, cytologic pleomorphism, degree of cohesiveness, size of individual cells, nuclear/cytoplasmic ratio, nuclear hyperchromasia, apocrine differentiation, and multinucleated giant cells. Also, cystic and especially solid lesions greater than 3 cm are more likely to be malignant, whereas benign lesions are usually less than 3 cm and are cystic.¹⁰ Furthermore, we have reviewed this case utilizing the previously described Masood's scoring system for evaluation of breast FNA,¹⁵ giving a value 1–4 for the following cytological findings: cellular arrangement, degrees of cellular pleomorphism, anisonucleosis, presence of myoepithelial cells, presence of nucleoli, and the status of chromatin patterns. A total score of 18 was calculated. A score of 18 indicates proliferative breast disease with atypia/atypical hyperplasia, which is compatible with our cytological diagnosis of this case as a papillary lesion favoring papillary carcinoma.

In male patients, the coincidence of breast carcinoma with prostatic carcinoma is 5%.¹⁶ However, it is important to distinguish between coincident tumors for a possible metastatic spread between the two entities. The lack of PSA and PSAP staining in the tumor cells can exclude prostatic origin.¹⁶

Breast and prostate cancer share common attributes, as they are both hormonally responsive cancers. This is based on the fact that the effects of estrogen are known to predispose the patients to breast cancer, yet these same estrogenic effects are used to treat prostate cancer.^{16,17} More recently cancer susceptibility syndromes have been characterized, which suggest possible genetic linkages between a risk of breast cancer and prostate cancer within families. For instance, as was mentioned earlier in this paper that BRCA-2 mutations have been associated with several large cohort studies with breast cancer risk in women, and breast and prostate cancer in men.^{16,18}

In conclusion, FNAB is a reliable diagnostic modality when it comes to diagnosing breast neoplasms in either men or women. In association with mammographic findings, immunohistochemical studies, and histological followup, FNAB can diagnose papillary neoplasms of breast with relative ease. In addition, the combination of male breast cancer and prostatic cancer is rarely reported in the literature. Although there are theories regarding this association, the underlying pathogenesis remains unclear.

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Figs. 1–11.

Fig. 1. Mammographic images: bilateral cranio-caudal (CC) compression view. **Figs. 2–7.** Fine-needle aspiration cytology (FNAC) smear of papillary carcinoma of the breast. **Figs. 2 and 3.** Papillary carcinoma of the breast, DQ stain, $\times 200$ and $\times 400$, respectively. **Fig. 4.** Papillary carcinoma of the breast, Papanicolaou stain, $\times 200$. **Fig. 5.** Cell-block of papillary carcinoma of the breast, hematoxylin–eosin stain, A $\times 300$. **Fig. 6.** Cell-block of papillary carcinoma of the breast, immunohistochemical stains for calponin, $\times 200$. **Fig. 7.** Cell-block of papillary carcinoma of the breast, immunohistochemical stains for mammaglobin, $\times 300$. **Figs. 8–11.** Histologic section of the excisional biopsy of papillary carcinoma of the breast. **Figs. 8 and 9.** Papillary carcinoma of the breast, hematoxylin–eosin stain, $\times 100$ and $\times 200$, respectively. **Fig. 10.** Papillary carcinoma of the breast, immunohistochemical stains for PSA, $\times 200$. **Fig. 11.** Papillary Carcinoma of the breast, immunohistochemical stains for mammaglobin, $\times 300$. [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com]