Virchows Arch (1998) 432:119–122

ORIGINAL ARTICLE

Jo Van Dorpe · Annemie De Pauw
Philippe Moerman

Adenoid cystic carcinoma arising in an adenomyoepithelioma of the breast

Received: 15 September 1997 / Accepted: 10 October 1997

Abstract Adenomyoepithelioma is a mixed epithelial and myoepithelial tumour. In rare cases adenomyoepitheliomas give rise to carcinomas with epithelial, myoepithelial, or mixed epithelial and myoepithelial differentiation. Carcinomas arising in adenomyoepithelioma range from low grade to high grade, and 15 cases have been reported in the literature. We describe a 36-year-old woman with a very rare adenoid cystic carcinoma arising in a tubular adenomyoepithelioma. The histogenesis of carcinoma arising in an adenomyoepithelioma is discussed.

Key words Breast · Adenomyoepithelioma · Adenoid cystic carcinoma

Introduction

Adenomyoepithelioma is a solitary tumour that shows prominent proliferation of myoepithelium with admixed epithelial elements [9]. The occurrence of this tumour in the breast was described and illustrated for the first time by Hamperl in 1970 [5]. On the basis of their growth pattern or cell type, adenomyoepitheliomas can be divided into three categories: tubular, spindle-cell and lobulated variants [9]. They are considered to be benign or low-grade malignant lesions, with local recurrences in some cases [6]. Very rare adenomyoepitheliomas are malignant de novo and retain a biphasic tubular pattern in their metastases [6, 11]. Carcinoma arising in an adenomyoepithelioma of the breast is rare. Fifteen cases have been reported [1–3, 7, 10, 12]. We report a very rare adenoid cystic carcinoma arising in a tubular adenomyoepithelioma.

J. Van Dorpe (✉) · P. Moerman
Department of Pathology, University Hospital St.-Rafaël, Minderbroedersstraat 12, B-3000 Leuven, Belgium
Tel.: (+32)-16-336600, Fax: (+32)-16-336624

A. De Pauw
Department of Pathology, General Hospital Maria-Middelares, St.-Niklaas, Belgium

Clinical history

A 36-year-old woman with no relevant medical antecedents presented with a juxta-areolar painless small nodule in the right breast. The clinical features were suggestive for a fibroadenoma. An excision biopsy was performed. As the lesion was only marginally excised, a moderate reexcision was recommended. Clinical examination did not give any indication of metastases. The patient showed no evidence of recurrence 1 year postoperatively.

Materials and methods

The specimen was fixed in 10% buffered formalin, routinely processed and paraffin embedded. Paraffin sections were stained with haematoxylin and eosin, and for cytokeratin (KL1; Immunotech, Marseille, France; monoclonal antibody, 1:75), alpha-smooth muscle actin (Sigma, St. Louis, Mo.; monoclonal antibody, 1:200), and S100 protein (Dako, Glostrup, Denmark; polyclonal antibody, 1:500) using a three-step indirect immunoperoxidase procedure.

Pathological findings

The excision biopsy measured 1.5×1.5×1.3 cm and showed a nodular, solid, white lesion with a diameter of 1.0 cm. The lesion was well circumscribed and surrounded by a thick fibrotic capsule (Fig. 1a). It consisted of irregular glandular structures with small lumina lined by an inner epithelial layer and an outer hyperplastic myoepithelial cell layer (Fig. 2a). The epithelial cells were cuboidal and had a moderately abundant eosinophilic cytoplasm; the myoepithelial cells were cuboidal or polyhedral and had some clear or slightly eosinophilic cytoplasm. Cell nuclei were round to oval and bland in both components. Small nucleoli were often present. In the haematoxylin and eosin sections it was not always possible to distinguish clearly between the epithelial and myoepithelial cells. In many glandular structures the hyperplastic myoepithelial component caused obliteration of the lumina by compression. The myoepithelial component showed up to two mitotic figures per 10 high-power fields. Between the glandular structures there was a loose, cellular fibroblastic stroma.

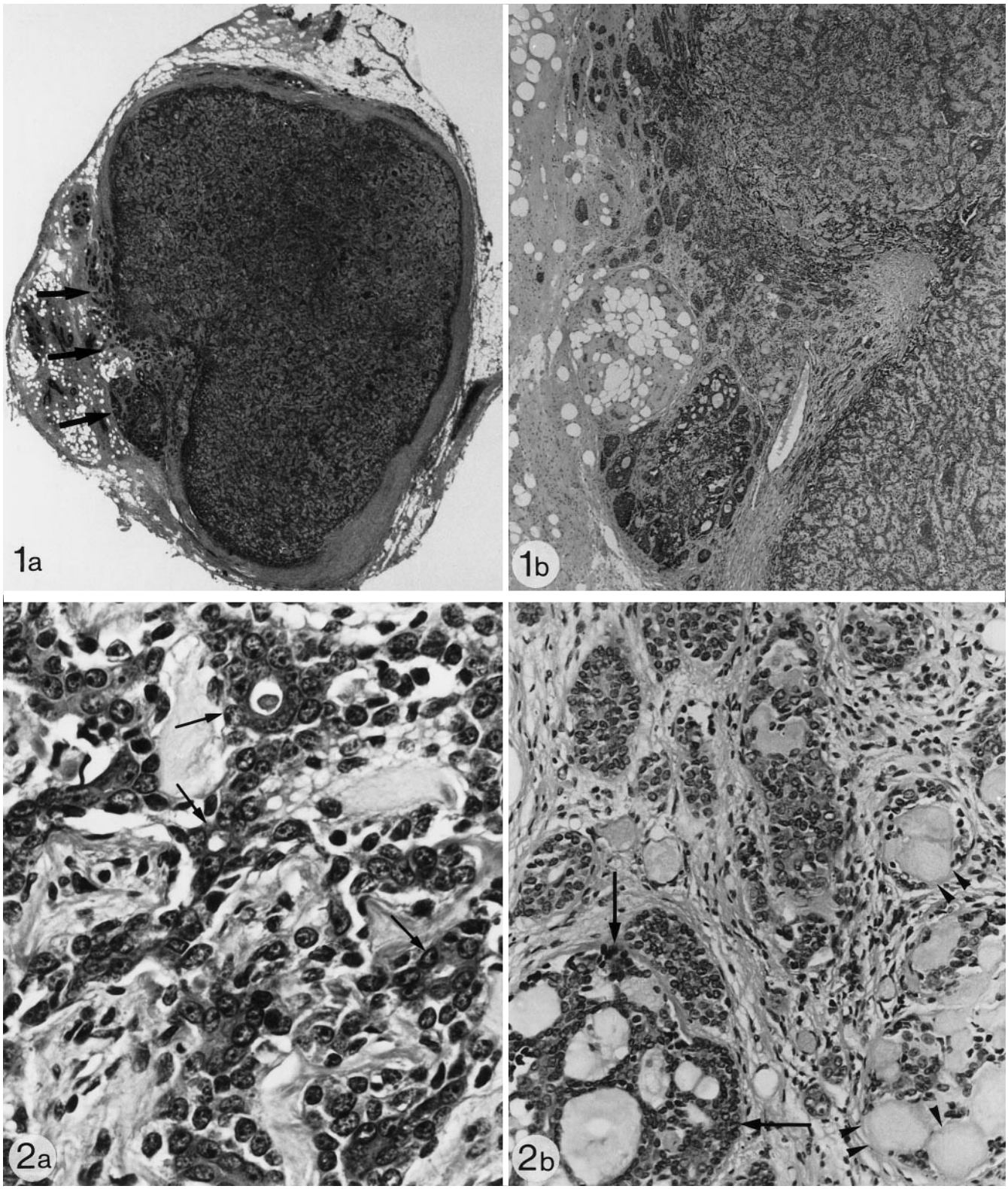

Fig. 1 **a** The tubular adenomyoepithelioma is well-circumscribed and surrounded by a thick fibrotic capsule. A focus of adenoid cystic carcinoma at the edge of the lesion penetrates the capsule (*arrows*). **b** Higher magnification of the adenoid cystic carcinoma penetrating the capsule

Fig. 2 **a** The adenomyoepithelioma consists of irregular glandular structures with small lumina (*arrows*) lined by an inner epithelial layer and a hyperplastic outer myoepithelial cell layer. In some glandular structures the lumina are compressed by the myoepithelial layer. **b** The adenoid cystic carcinoma component shows cribriform and tubular structures. The cribriform structures are punctated by pseudolumina with basement-membrane-like material (*arrowheads*) and lumina with mucoid secretory material (*arrows*)

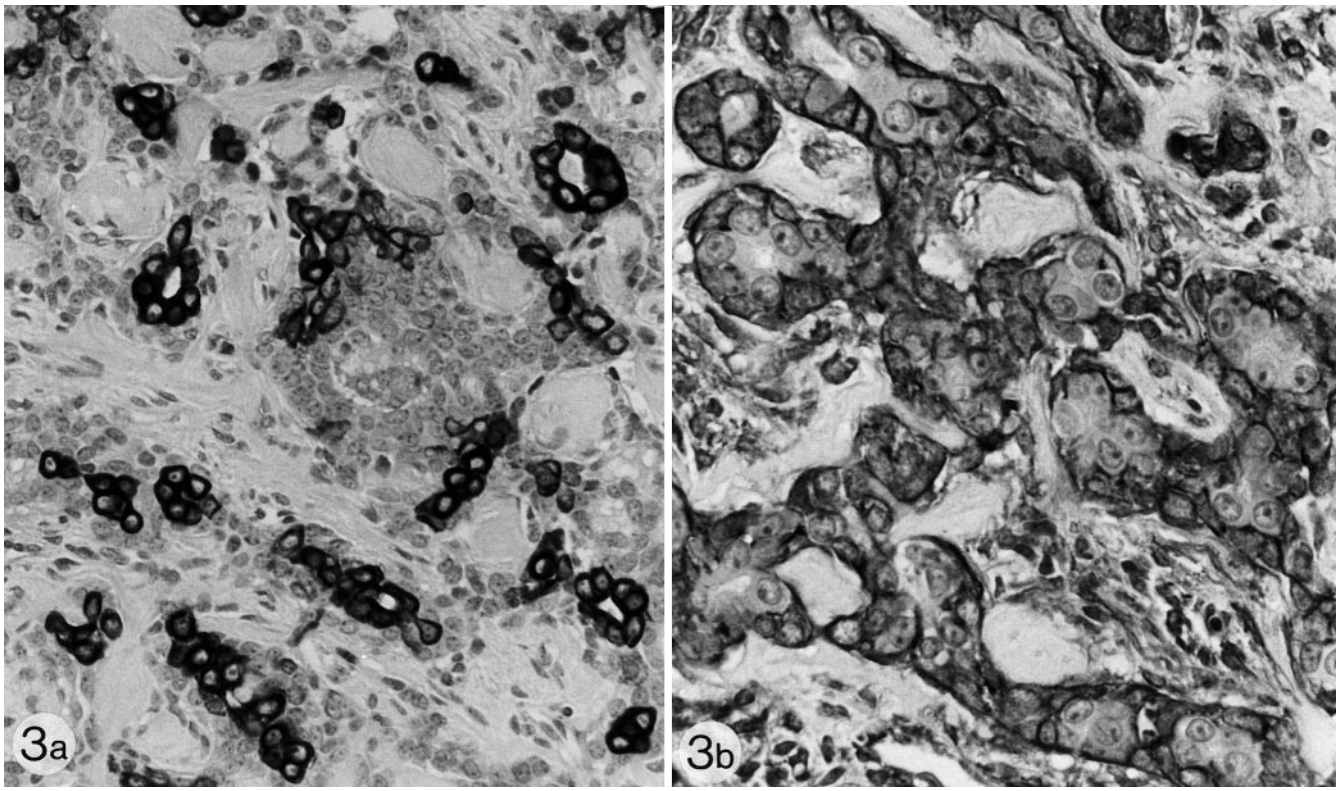

Fig. 3 **a** Staining for cytokeratin is strong in the epithelial cell layer, but very weak in the myoepithelial layer. **b** The outer myoepithelial cell layer stains for alpha smooth muscle actin

At one edge a focus of adenoid cystic carcinoma arose from the tubular adenomyoepithelioma (Fig. 1a, b). The adenoid cystic carcinoma component had a diameter of 0.3 cm and perforated the fibrotic capsule. It consisted of cribriform and tubular structures, composed of dark basaloid (myoepithelial) cells and slightly larger ductal (epithelial) cells with an eosinophilic cytoplasm (Fig. 2b). The cribriform structures were punctated by spaces filled with basement-membrane-like material (hyaline bodies) and mucoid secretory material. Perineural invasion was not seen.

Immunohistochemically, the epithelial cells in the adenomyoepithelioma reacted strongly for cytokeratin (Fig. 3a). The myoepithelial cells stained for alpha-smooth muscle actin (Fig. 3b) and S100 protein; staining for cytokeratin was very weak. The adenoid cystic carcinoma component showed a similar staining pattern, with srong positivity for cytokeratin in the epithelial cells and positivity for alpha smooth muscle actin, S100 protein, and cytokeratin (weak) in the myoepithelial cells.

Discussion

Fifteen cases of carcinoma arising in an adenomyoepithelioma have been reported in the literature [1–3, 7, 10, 12]. These carcinomas were classified as low-grade adenosquamous carcinoma [3, 12] (6 cases), undifferentiated (sarcomatoid) carcinoma [3, 7] (4 cases), myoepithelial carcinoma [1, 2, 10] (malignant myoepithelioma; 3 cases), adenocarcinoma [10] (1 case), and adenoid cystic carcinoma [10] (1 case). Low-grade adenosquamous carcinoma (LGASC) is the most frequently reported carcinoma arising in an adenomyoepithelioma; Van Hoeven et al. [12] and Foschini et al. [3] each reported 3 cases. LGASC of the breast, first described by Rosen and Ernsberger [8] in 1987, is an uncommon well-differentiated mammary neoplasm composed of glandular structures with variable amounts of epidermoid differentiation, proliferating in a background of dense collagenous stroma in a pattern reminiscent of syringomas. Clinical behaviour of LGASC is indolent, but locally aggressive. The second most frequently reported carcinoma arising in an adenomyoepithelioma is sarcomatoid carcinoma [3, 7]. It is a high-grade (undifferentiated) carcinoma that consists of a proliferation of atypical spindle cells without immunohistochemical (or electron microscopic) features of myoepithelial differentiation. Three cases of myoepithelial carcinomas arising in an adenomyoepithelioma have been reported [1, 2, 10]. The lesions were composed of spindle cells with immunohistochemical and/or electron microscopic features of myoepithelial cells [2, 10]. The patient in Chen's report [2] died of metastatic disease. The second and third case in Tavassoli's series [10] were an adenocarcinoma and an adenoid cystic carcinoma arising in an adenomyoepithelioma. The adenocarcinoma was interpreted as a high-grade adenocarcinoma. The lesion was confined to the boundaries of the adenomyoepithelioma. Tavassoli's

case of adenoid cystic carcinoma arising in an adenomyoepithelioma very much resembles our own case. The adenoid cystic carcinoma was small and confined to the peripheral aspect of the lesion. The adenomyoepithelioma, however, was a lobulated variant.

The histogenesis of carcinoma ex adenomyoepithelioma is unclear, but is somewhat reminiscent of the histogenesis of carcinoma exmixed tumour of the salivary gland. However, in carcinoma exmixed tumour, the malignancy is usually limited to the epithelial component (undifferentiated carcinoma or adenocarcinoma not otherwise specified) [4]. Rare adenoid cystic carcinomas and carcinosarcomas arising in a mixed tumour have been described [4]. In rare cases, adenomyoepitheliomas give rise to carcinomas with epithelial (sarcomatoid carcinoma and adenocarcinoma), myoepithelial (myoepithelial carcinoma), or mixed epithelial and myoepithelial (adenoid cystic carcinoma) differentiation. Foschini et al. [3] reported in their cases of LGASC arising in an adenomyoepithelioma an outer myoepithelial layer expressing smooth muscle actin encircling epithelial secretory cells. This suggests that LGASC, like adenoid cystic carcinoma, is a carcinoma with mixed epithelial and myoepithelial differentiation. The existence of rare malignant adenomyoepitheliomas that retain the biphasic pattern in their metastases suggests a common pluripotent progenitor cell for the epithelial and myoepithelial elements. It is possible that adenoid cystic carcinoma and LGASC ex adenomyoepithelioma develop from the same pluripotent progenitor cell. There seems to be a spectrum of adenomyoepithelioma-related epithelial and myoepithelial lesions that ranges from low grade to high grade.

Adenoid cystic carcinoma is a low-grade lesion. In contrast to the aggressive behaviour of salivary gland adenoid cystic carcinomas, mammary adenoid cystic carcinomas have an excellent prognosis [10]. For both mammary adenomyoepitheliomas and adenoid cystic carcinomas, complete excision with a margin of uninvolved tissue is the recommended treatment [10].

References

1. Cameron HM, Hamperl H, Warambo W (1974) Leiomyosarcoma of the breast originating from myothelium (myoepithelium). J Pathol (Lond) 114:89–92
2. Chen PC, Chen CK, Nicastri AD, Wait RB (1994) Myoepithelial carcinoma of the breast with distant metastasis and accompanied by adenomyoepitheliomas. Histopathology 24:543–548
3. Foschini MP, Pizzicannella G, Peterse JL, Eusebi V (1995) Adenomyoepithelioma of the breast associated with low-grade adenosquamous and sarcomatoid carcinomas. Virchow Arch [A] 427:243–250
4. Gnepp DR (1993) Malignant mixed tumors of the salivary glands: a review. Pathol Annu 28:279–328
5. Hamperl H (1970) The myoepithelia (myoepithelial cells): normal state, regressive changes, hyperplasia, tumors. Curr Top Pathol 53:161–220
6. Loose JH, Patchefsky AS, Hollander IJ, Lavin LS, Cooper HS, Katz SM (1992) Adenomyoepithelioma of the breast: a spectrum of biological behavior. Am J Surg Pathol 16:868–876
7. Michal M, Baumruk L, Burger J, Manhalova M (1994) Adenomyoepithelioma of the breast with undifferentiated carcinoma component. Histopathology 24:274–276
8. Rosen PP, Ernsberger D (1987) Low-grade adenosquamous carcinoma: a variant of metaplastic mammary carcinoma. Am J Surg Pathol 11:351–358
9. Tavassoli FA (1991) Myoepithelial lesions of the breast: myoepitheliosis, adenomyoepithelioma, and myoepithelial carcinoma. Am J Surg Pathol 15:554–568
10. Tavassoli FA (ed) (1992) Pathology of the breast. Appleton and Lange, Norwalk
11. Trojani M, Guiu M, Trouette H, De Mascarel I, Cocquet M (1992) Malignant adenomyoepithelioma of the breast: an immunohistochemical, cytophotometric, and ultrastructural study of a case with lung metastases. Am J Clin Pathol 98:598–602
12. Van Hoeven KH, Drudis T, Cranor ML, Erlandson RA, Rosen PP (1993) Low-grade adenosquamous carcinoma of the breast: a clinicopathologic study of 32 cases with ultrastructural analysis. Am J Surg Pathol 17:248–258