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Cytological Features of Columnar Cell Lesions of the Breast

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Abstract

Columnar cell lesions in the breast are seen as mammographic microcalcifications. Occasionally they may be seen on ultrasound imaging. Cytological material from these lesions is rarely obtained, but seem to mirror the heterogeneous histological findings ranging from benign to low grade atypia. The cytological features of a handful of cases are described and demonstrated in this short report.

Keywords: Columnar Cell Lesions • Cytology • Fine Needle Aspiration Cytology • Breast

Introduction

Columnar cell changes in the breast are borderline/proliferative lesions seen in the terminal-duct lobular unit (TDLU) [1]. They are seen radiologically as clustered, amorphous, or fine pleomorphic microcalcifications that are deposited within the duct lumina of the TDLUs [2]. Amorphous calcifications are very fine and have an indistinct contour. They are found on a regular basis in mammography screening (Figure 1). Most microcalcifications are investigated by stereotactic vacuum biopsies, but some may also be seen by ultrasound examination. Incidental cases may have work-up with fine-needle cytology (Figure 1).

The histology presents a morphological continuum of changes from enlarged variably dilated acini lined (Figure 2) by a single layer of columnar epithelial cells to flat atypia (FEA) (Figure 3) with replacement of the native epithelial cells by one to several layers of single of a single epithelial cell type showing low-grade (monomorphic) cytological atypia (Figures 2 and 3).

The histomorphological findings are listed in table 1. (Table 1)

Columnar cell lesions (CCL) are rarely seen in cytology. The diagnostic criteria have not been defined but some cytological features have been documented

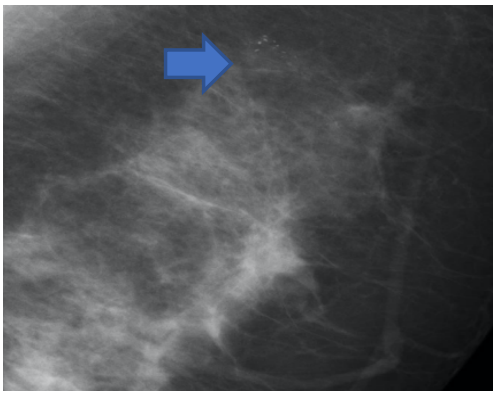

Figure 1. Mammographic image of clustered microcalcifications histologically verified as CCL.

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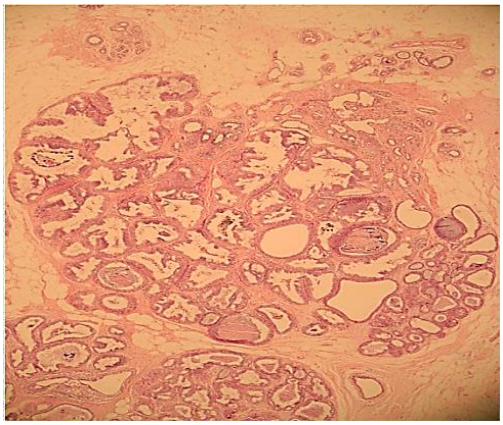

Figure 2. Overview of TDLU with columnar cell changes. HE stain; magnification × 40.

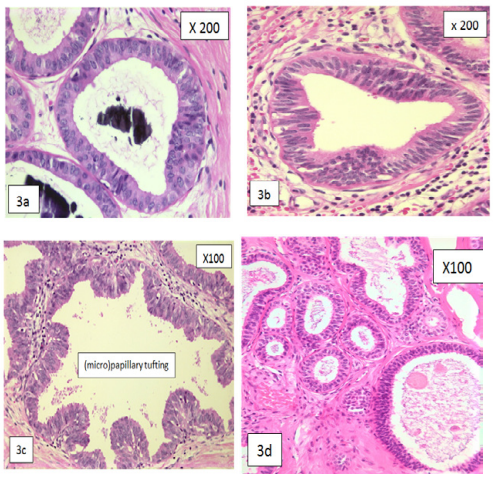

Figure 3(a-d). Histomorphology of flat epithelial atypia (FEA) (HE).

Table 1. Histomorphology of columnar cell lesions.

1	A spectrum of changes characterized by dilatation of TDLU (terminal ductular lobular unit)
2	A columnar cell lining varying from 1-5 cell layers
3	With or without hyperplasia
4	With or without cellular atypia
5	Heterogeneous with a continuum of morphological changes
6	Hyperplasia with atypia (flat epithelial atypia, DIN1A): A neoplastic lesion of the TDLU characterized by replacement of the native epithelial cells by a single or 3-5 layers of mildly atypical cells

[3-5]. The aim of this short report is to present some characteristic cytological features from a handful of FNAC cases from histologically verified columnar cell lesions including flat epithelial atypia (FEA).

Materials

The material represents FNAC from mammographic grouped microcalcifications of undetermined dignity. Direct smears are MGG stained. Liquid based material was prepared from Surepath® (BD, Becton Dickinson Ltd., UK) and Papanicolaou stained.

Results and Discussion

The cytomorphological features are listed in table 2 and are detailed in figures 4-7 (Table 2 and Figures 4-7).

The cytological findings show a continuum of architectural and cellular changes ranging from benign to low grade atypia. The cellularity is moderate (Figure 4) with monolayer and three-dimensional (Figure 5) cohesive groups, microcalcifications, palisading epithelial strips (Figure 6) as well as micropapillary and tubular (Figure 7) structures. The nuclear changes are discrete with an even chromatin and indistinct nucleoli. Myoepithelial cells and background debris may be seen. The full spectrum of cytological features is not known, but histologically CCL harbors a continuous spectrum of architectural and cellular/nuclear changes from benign to low-grade atypia. There is a risk of both over- and underdiagnosis. The differential diagnosis includes low-grade carcinoma (eventually only in situ) and benign proliferative lesions like usual ductal hyperplasia (UDP) and adenosis (including sclerosing adenosis). The radiological findings will usually warrant a diagnostic biopsy and the cytological reporting might not be critical. A diagnosis of C 3/equivocal atypia would be the most likely. A FNAC sample could occasionally include cell material from areas of ductal or lobular carcinoma from the same lesion and thus be signed out as suspicious. Columnar cell lesions represent low grade borderline changes in the female breast. The main risk is a more severe, concomitant lesion which may be a low-grade invasive carcinoma (ductal/NST, lobular or tubular carcinoma) or a low-grade ductal and/or lobular carcinoma in situ (DCIS and LCIS). The long term risk of invasive or in situ carcinoma is very low [1].

The following case is an illustrating example of a concomitant carcinoma:

Case example: A 65 yrs. old woman had US-guided FNAC (Figure 8) from a 1 cm group of equivocal microcalcifications. The FNAC revealed cohesive, complex aggregates of epithelial cells. The case was reported as equivocal or atypia according to the Yokohama Classification System for breast cytology [6] and a surgical resection was done. Macro photo (Figure 9) revealed two

Table 2. Cytomorphology of columnar cell lesions.

1	Cohesive monolayer sheets
2	Transition from monolayer to three-dimensional aggregates (cohesive)
3	Palisading strips
4	Parts of tubular structures
5	Microcalcifications
6	Discrete nuclear changes
7	Myoepithelial cells may be present, but are few in number
8	Debris

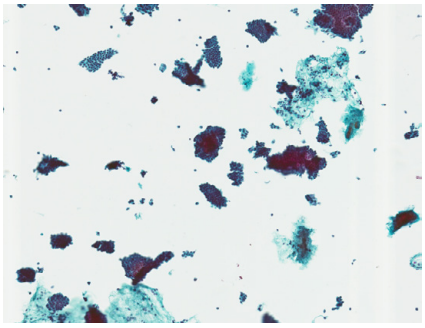

Figure 4. Overview of liquid based preparation (Surepath, BD, Becton Dickinson Ltd., UK) from columnar cell lesions showing cohesive groups: monolayer and three-dimensional aggregates, a tubular structure, a micropapillary group, a small palisading strip and debris.

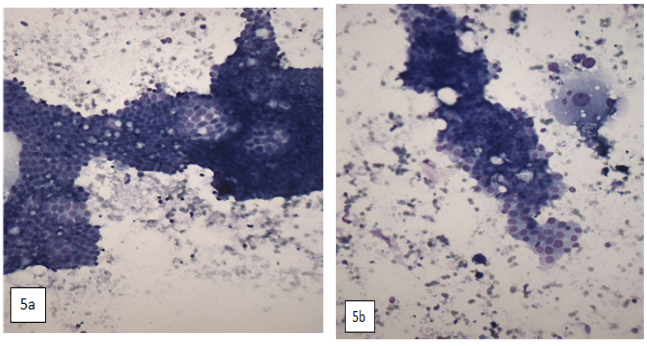

Figure 5(a,b). Cytomorphology of columnar cell lesion with cohesive complex sheet, partly monolayer and partly three-dimensional. Myoepithelial nuclei seen and debris in the background. MGG; magnification × 200.

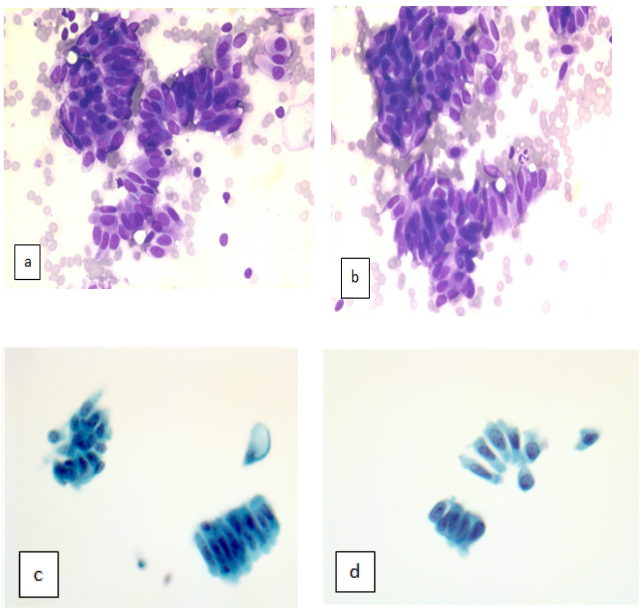

Figure 6(a-d). Cytomorphology of columnar cell lesion with palisading epithelial strips and micropapillary "tufting". Cohesive groups with recognizable myoepithelial nuclei. MGG and Papanicolaou (Surepath); magnification × 400.

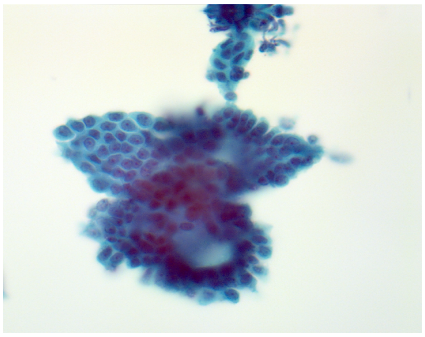

Figure 7. Cytomorphology of tubular structure in Surepath LBC preparation from columnar cell lesion.

lesions close to each other. The lesion closest to the dorsal resection margin (marked with black ink) represented a columnar cell lesion (Figure 10). The "twin" lesion, however, was a tubular carcinoma (Figure 11) (Figures 8-11).

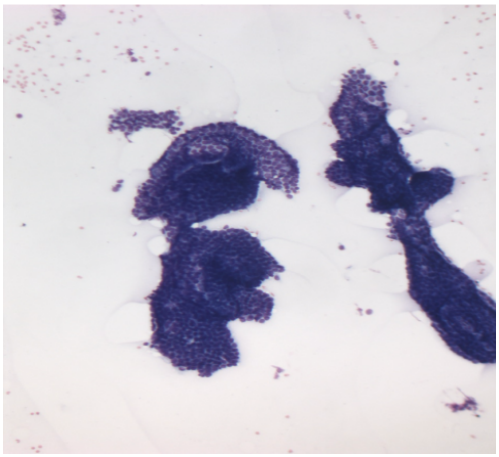

Figure 8. Direct smears showing cohesive and complex epithelial aggregates. MGG; magnification × 100.

Figure 9. Macro overview of section with two lesions HE stained.

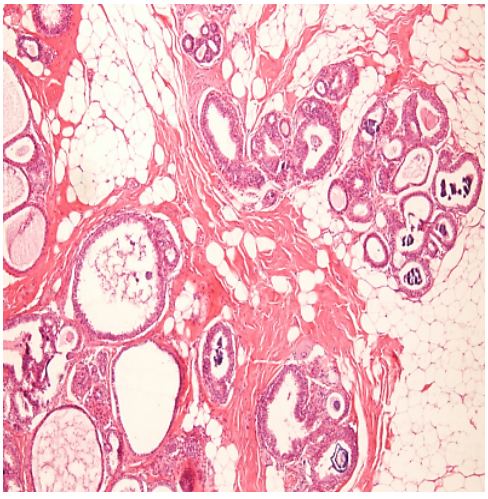

Figure 10. Columnar cell lesion with luminal microcalcifications as well as cystic acini with a variable intra-acinar epithelial cell proliferation. HE; magnification × 50.

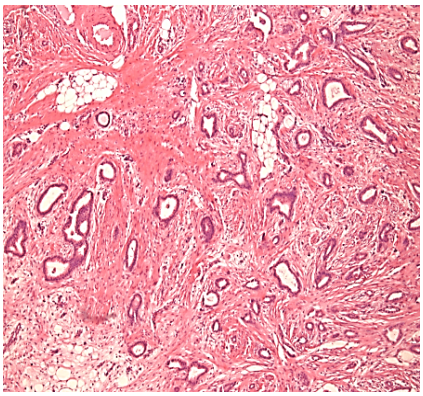

Figure 11. Tubular carcinoma situated close to the columnar cell lesion.

Conclusions

The cytomorphology of columnar cell lesions mirror the histological architectural and cellular continuum of changes from benign to low grade atypia. The differential diagnoses include low grade invasive carcinoma, DCIS and LCIS as well as proliferative borderline or benign lesions. The cytological findings would be diagnosed as atypia in most cases and come with a recommendation of core needle biopsy (CNB).

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