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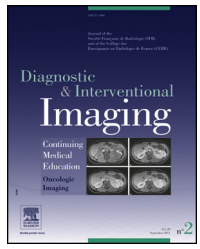

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# Radio-histological correlations of subtle sonography images

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**Abstract** Breast lesions may, during their development, provide sonography signs can be difficult to view or are not very specific. They are called ''subtle images''. Proximal (ductal) lesions are differentiated from distal (ductal-lobular) lesions. Proximal lesions are mainly inflammatory or infectious, altering the duct walls that evolve into ectasia and then fibrosis with possible acute episodes of plasmocyte mastitis or bacterial mastitis. The fibrovascular stalks of the papilloma accounts for the Doppler flow. Certain secretory forms of intra-ductal carcinoma may distend the structure of the milk ducts. The sonography of lesions of the ductal-lobular units are related to the degree of fibrosis, the atrophy or cell proliferation, and the disorganisation of the architecture. The extent of the fibrosis, or the cell density of certain tumours may modify the tissue hardness in elastography.


Sonography is currently a major tool in the diagnosis and treatment of breast diseases due to the excellent contrast between the mammary gland and most lesions. Nevertheless, some diseases are more discrete in the sonogram due to the constituents of the breast involved and their mode of development. Disorders that affect the segmentation of the milk ducts are inflammatory, infectious or tumoral and sometimes difficult to distinguish from the aspects commonly found. Disorders of the ductal-lobular unit, depending on their nature and mode of progression, will modify the echogenicity and the breast architecture. The diagnosis by sonography does depend on a good understanding of the clinical manifestations and histological modifications induced by these disorders.

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## Milk duct disorders

Each breast comprises about 8 milk ducts [1]. Each of these ducts leads into the ''terminal duct lobular unit'' defined by Wellings. The ducts and lobules are lined with a double layer of cells, an inner layer of cylindrical epithelial cells and an outer layer of myoepithelial cells (Fig. 1). The imaging of these ducts in the retroareolar region (lactiferous sinuses) varies greatly according to the individual and their gynaecological history (pregnancies, nursing). In the sonogram, the milk ducts, when visible, appear in the form of transonic tubular structures whose diameter progressively decreases when moving to the periphery, without a focal zone of distension [2] (Fig. 2).

The most common disorders are inflammatory and infectious, with several stages ranging from simple duct ectasia, developing into a chronic form with peri-ductal mastitis or comedo mastitis, possibly complicated in the form of episodes of acute mastitis. Women between the age of 30 and 80 years are affected, predominantly in perimenopause. Outside of the acute episodes, these disorders present few symptoms, over several years, with episodes of painful tumefaction, inconstant, most often unilateral, yellowish or greenish, rarely haemorrhagic nipple discharge. In the menopausal woman, the progressive retraction of the nipple is observed.

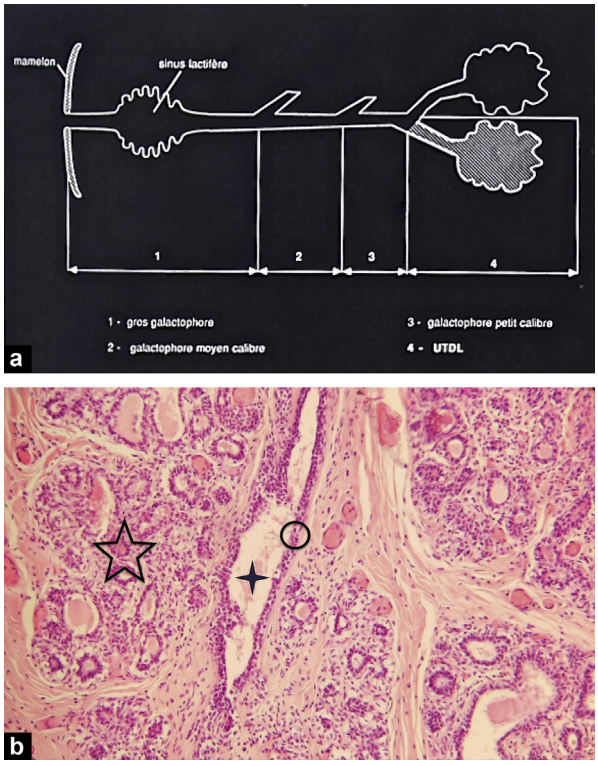


**Figure 1.** Description of the ductal-lobular anatomy: a: diagram of the lactiferous segmentation; b: histological correlation (×200): duct (black cross), lobule (star), double layer of cells (circle).

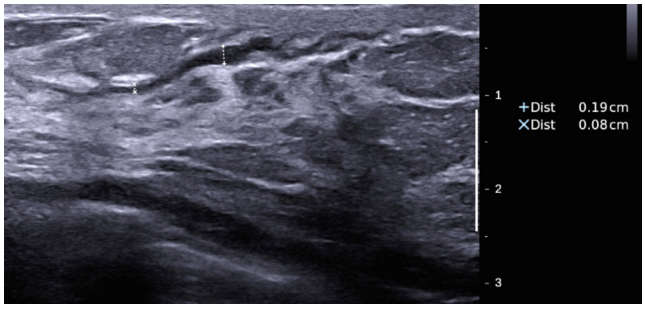


**Figure 2.** Normal lactiferous duct. Lactiferous sinus and more distal portion.

### Simple duct ectasia

Simple duct ectasia is a dilation of the duct exceeding 2 mm, and 3 mm in its ampullar portion. The pathogenesis remains controversal but seems to be related to an infectious peri-ductal inflammation that may be due to anaerobic germs [3]. The main lesion is the destruction of the peri-ductal support tissue (Fig. 3), rich in elastic fibers, that leads to the dilation of the duct [4]. This inflammation remains moderate and the beginning form is not visible on the sonogram except for duct ectasia. Duct ectasia is accompanied by intraluminal acidophilic material with amorphous debris and spumous macrophages, possibly visible in sonography as intraluminal echogenic structures that may resemble an intra-ductal papilloma (Fig. 4). Doppler analysis is very useful in confirming the caseous and non-tumoral nature of this endoluminal material.

### Mammary duct ectasia

In the later forms, this inflammation becomes more pronounced and, on the sonogram, appears as a slightly hypoechogenic coating surrounding the duct, and at times shrinking it, thereby creating segmental ectasia (Fig. 5). Histologically, the wall of the duct thickens with the production of a fibrosis and lympho-plasmocytary infiltration of the walls [5,6]. There is no epithelial proliferation but atrophy. This is called peri-ductal mastitis or mammary duct ectasia. In advanced forms in the elderly woman, this fibrosis has a retractile component, inducing invaginated nipple and sometimes rigidity of the ducts.

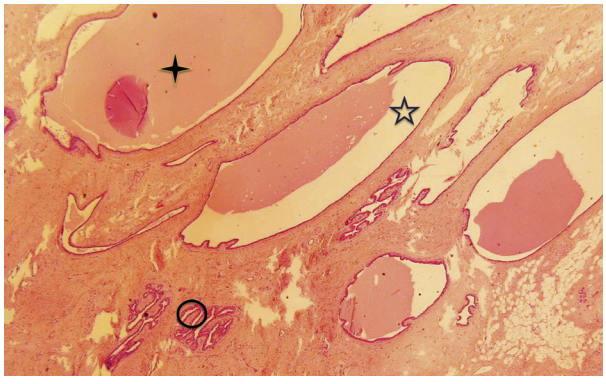

**Figure 3.** Simple ductal ectasia (×100). Distinct dilation of the ducts (star). Amorphous intra-ductal substance (black cross). Normal duct (circle).