Learning objectives

• To be familiarized with the clinical and radiological presentations of sclerosing adenosis;
• To be aware of sclerosing adenosis as a mimicker of breast malignancy;
• To correlate histopathological features with the imaging findings.

Background

Definition

Sclerosing adenosis (SA) is a benign proliferative disease of the breast that may mimick breast carcinoma, either with clinical, imaging or histological features, which is the main reason for its clinical importance. The name itself reflects its histologic appearance as a combination of fibrotic scarring (sclerosis) and glandular hyperplasia (adenosis).

It occurs more frequently in perimenopausal women, many times with a family history of breast cancer [1]. Although there are some conflicting data on literature, recent studies have shown that it is associated with a doubling risk of breast cancer [1].

Histologic features

Breast imaging compels to a formal knowledge of the normal histology of the breast in order to establish a concordance between the histopathological features and the imaging findings of lesions. This will be critical in determining the need for further rebiopsy or surgical resection.

Normal breast is composed of large lactiferous ducts which open through pores in the nipple during lactation. Each lactiferous duct, branches out deep into the breast tissue in a dichotomously fashion, where a single large duct successively branches down to its most terminal level - the terminal duct lobular unit (TDLU), the functional and structural unit of the breast. This is composed of a terminal duct and its respective collection of small ductules/acini (according to their tubular or rounded shape, respectively) which produce milk. The overall branching system of each lactiferous duct constitutes a "lobe" whereas the duct system (ductules/acini) arising from each terminal duct is called a "lobule". Each
ductule/acinus is lined by two layers: an outer complete layer of myoepithelial cells (which help discharge milk into the terminal duct by contracting) and an inner layer of cuboidal to columnar epithelial cells, enveloped in a basement membrane and the surrounding stroma containing fibroblasts, lymphocytes and plasma cells.

The main histopathological alterations seen in SA occur at the level of the TDLU. They consist on proliferation of epithelium (duplicated, crowded acini) and myoepithelium associated with stromal fibrosis and elastosis. The increase in glandular elements plus stromal proliferation and the proemience of the myoepithelium distort and compress glands. Florid changes are associated with pregnancy. Despite the pronounced distortion, lobular architecture is preserved. Rarely, SA may extend into fat or even show perineural invasion [3].

The main diagnosis in the differentiation of SA is low-grade breast carcinoma [6]. Demonstration of the integrity of the myoepithelium and the basement membrane is critical in differentiating SA from a malignant process with which it can sometimes co-exist (both invasive and in situ cancers). In this regard, differentiation from lobular carcinoma in situ is particularly problematic.

The wide spectrum of imaging appearances mirrors the broad alterations of breast tissue bed. The relative proportions of the cellular elements of the epithelial and mesenchymal compartments will determine the extent of SA and its form (ranging from a microscopic focus to an architectural distortion or a mass). If the lesion presents as a tumoral mass it can be called "adenosis tumor" or "nodular sclerosing adenosis".

Findings and procedure details

On physical examination SA can manifest as a palpable firm mass or multiple firm palpable ill-defined masses.

The most frequent imaging findings alternate between masses and microcalcifications in several studies. [3],[4],[5].

Mammography may depict mass lesions (varying from well-defined to irregular or spiculated forms), focal architectural distortion or radial sclerosing lesions. Despite its high suspicious association with malignancy, contour irregularity in mass lesions may occur both in the setting of a benign lesion like SA (by fibrosis and stromal sclerosis) and in the presence of a malignant lesion (as a consequence of desmoplastic reactions, local invasion and periductal fibrosis). Likewise, stellate appearance is not exclusive of
malignancy and may be seen in SA, fat necrosis, radial scars and surgical scars. Previous suggestion that in spiculated lesions radiodensity of the center of the lesions could be used to differentiate benign from malignant (radiolucent and radiodense, respectively) proved to be unreliable. The microcalcification pattern described in the literature in association with SA depicts benign features, most frequently clustered amorphous or pleomorphic punctate or scattered amorphous punctate [5].

Ultrasonography is of particular value in the diagnosis and description of lesions in extremely dense breasts (as diagnosis of a mass lesion on mammography is unattainable). Detectable lesions are seen when the diameter of the terminal duct lobular unit (TDLU) exceeds 5mm. Mass lesions can appear microlobulated, angulated or spiculated. Tumoral adenosis will appear either defined or not depending on the character of the surrounding tissue determining their interfaces: if surrounded by fibrous tissue it will be undefined whereas it will be apparent if surrounded by hypoechoic fat tissue [5]. Focal acoustic shadowing with or without a noticeable lesion can occur with SA.

In MRI, SA may appear as a non-mass lesion with indistinct margins or as a mass lesion either with regular or spiculated contours. It usually appears as an enhancing lesion due to the presence of sclerosis and elastosis, with an enhancement pattern (patchy, diffuse) that depends on sclerosing adenosis’ histologic pattern. Enhancement kinetics is variable and overlaps considerably with the pattern of malignant lesions. Some suggest assessing lesions’ characteristics throughout the different phases of the menstrual cycle and if the pattern varies, being less conspicuous in the mid-cycle, the diagnosis of fibrocystic disease (where SA is included) is likely. Furthermore, SA coexistence with an in situ carcinoma is very difficult to distinguish from an invasive carcinoma. Thus, despite MRI’s high sensitivity in detecting breast lesions, it still lacks specificity is such cases.

Images for this section:
Fig. 1: Histologically confirmed sclerosing adenosis. Several mammograms showing diffuse (a,b) and clustered (c) pleomorphic microcalcifications. a) Top right: excisional biopsy radiogram of the microcalcifications.
**Fig. 2:** Histologically confirmed sclerosing adenosis. a) Mediolateral oblique mammogram of the right breast shows a nodular lesion with irregular margins. This lesion was predominantly hypoechoic with poorly defined contours (b).

**Fig. 3:** Histologically confirmed sclerosing adenosis. a) Sonography exhibits mass lesion with partial irregular contour and heterogeneous internal echogenicity, with parallel orientation to the skin. b) MRI shows an area with multiple foci of high intensity signal...
in T2 sequency (b) that translates into an heterogeneous enhancing area with multiple hyper-enhancing foci in post-contrast subtraction dynamic study (c).

Fig. 4: Histologically confirmed sclerosing adenosis. a) sonography exhibits an area of heterogeneous ecogenicity, with indistinct margins and mild focal acoustic shadowing; b) MRI of the lesion described in a) reveals a clustered unmass enhancement on postcontrast dynamic series.
**Fig. 5:** Histologically confirmed sclerosing adenosis. MRI Out Phase Ax T2 FSE-IDEAL (a), shows a retromamilar mass in the left breast, with irregular shape and contour (arrow), with intermediate intensity. In post-contrast subtraction dynamic study (b), it exhibited a slow and progressive enhancement after paramagnetic contrast.
**Fig. 6:** Several US presentations of histologically confirmed sclerosing adenosis. 

a) circumscribed solid nodular mass, with heterogeneous ecogenicity. 

b) poorly marginated hypoecogenic area with posterior acoustic shadowing. 

c) hypoecogenic nodule with partially defined margins. 

d) grossly nodular lesion with indistinct margins and heterogeneous internal ecogenicity. There is some posterior acoustic shadowing.
Fig. 7: Sclerosing adenosis of the breast histologically confirmed. US study (a) exhibits a hypoecogenic nodule with irregular lobulated contours. The corresponding MRI T2-weighted images (b) and eTHRIVE-HR (c), show in the left breast a nodular lesion with irregular contours and intermediate signal intensity. Subtraction dynamic images in early (d) and late (e) series, shows that this lesion has heterogeneous, progressive enhancement with a corresponding type 2 kinetic curve.
Conclusion

SA is a benign proliferative lesion that can mimic malignancy either clinically (by producing a mass), radiographically (by exhibiting features more often associated with invasive processes) and even histologically (exaggerated distortion of lobular architecture).

The unspecificity of imaging findings demands a core needle biopsy or excisional biopsy to differentiate between a benign and a malignant lesion keeping in mind that SA can co-exist with a carcinoma. Concordance between histopathology and imaging findings should always be assessed.

Personal information

References


