

SHORT REPORT

Liesegang Rings in Breast Tissue: An Unusual Component of a Foreign Body Reaction

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Liesegang rings (LRs) are rare, acellular laminated ring-like structures that have been observed mostly in inflammatory, cystic, necrotic and hemorrhagic tissue processes (1,2). They can accompany various lesions: renal cysts, necrotic renal tissue, breast cysts, eyelid cysts, conjunctival cysts, inflamed synovium, peritoneal endometriotic implants and mucocele of the paranasal sinuses (1-3).

The rings are characterized by peripheral concentric layers with radial cross-striations that surround an amorphous, central core (1-5). They are usually spherical but can vary in shape and size from 5 to 820 µm (1,2,4). Concentric laminated morphology can be accentuated with Papanicolaou, Hematoxylin-Eosin, Diff-Quick, Masson's trichrome and Gram stains (1,2). LR's can be mistaken in cytologic and histologic specimens for ova, larvae, adult parasites (such as *Dioctophyma renale* or *Echinococcus*), corpora amylacea, calcifications or inanimate foreign material (1,5,6).

LRs have rarely been reported in benign cyst aspirates from the breast (1,2,4-7). They are also observed in areas of fat necrosis and breast abscess (4,8). Here, we describe LR's in relation to a foreign body reaction to suture material in breast tissue. While LR's are observed in inflammatory and necrotic tissue processes, their existence in a background of a foreign body reaction is

very rare. In our search of the literature we found only a case report describing LR's within mural granulomatous foreign body reaction foci in a ruptured dermoid cyst (9). The formation of LR's in association with a tissue reaction to suture material has not been reported before.

Case Report

A 52-year-old woman was admitted with a mobile cystic mass measuring 0.5 x 0.5 cm in the left upper outer quadrant of the breast. The patient stated that she had been aware of the mass for 3 months. Her medical history was remarkable in that she had a silicone implant for breast augmentation a year before. Clinically, there was no suspicion of a complication regarding the silicone implant such as infection, skin necrosis, implant rupture, capsule formation or hemorrhage. The cystic mass was removed by an excisional biopsy.

The removed specimen measured 1.5 x 1.5 x 1.5 cm. In cross section, a small cystic lesion measuring 0.5 cm in diameter was observed. Microscopically, the cystic cavity was lined by numerous histiocytes, foreign body type giant cells, neutrophils and lymphocytes supported by granulation tissue. An epithelial lining was absent. In the cystic cavity, several spherical laminated rings were intermingled with suture material and inflammatory cells. These ring-like structures resembled a laminated

calcification (psammoma body), corpora amylacea or an ova of a parasite. The rings had an amorphous, central core surrounded by a double layered wall with cross-striations, accentuated with Papanicolaou, Hematoxylin-Eosin, Masson's trichrome, PAS and Gram stains (Figure). They showed negative staining with von Kossa stain. Under polarized light the rings were nonbirefringent. However, a few of them were observed to contain a piece of birefringent suture material within their central core.

Liesegang phenomenon is an in vitro physico-chemical precipitating process described by the German biochemist Ralph E. Liesegang. It involves the formation of concentric laminated rings by periodic precipitation of certain chemicals around a central nidus in a colloidal gel or matrix (1,2,5). Though in vivo occurrence is rare, similar physico-chemical factors may be involved in the formation of LRs, including chemical concentration, matrix medium, temperature, pH and the presence of impurities (1,2).

The exact composition of LRs is not yet fully understood. Immunohistochemical and histochemical stains for calcium, iron, mucopolysaccharide, amyloid, glycogen, keratin and epithelial membrane antigen are negative (1,4,5). Electron probe micro-analysis of LRs in a renal cyst aspirate by Tuur et al. (10) demonstrated

emission energy peaks for silicon, calcium and sulfur. However, other investigations suggest an organic composition and do not demonstrate an inorganic element (2). It may be that LRs accompanying different pathological processes at various sites are of different chemical compositions varying with the local factors.

The formation of LRs is usually related to inflammatory, cystic, necrotic and hemorrhagic tissue processes (1,2). They have rarely been identified in breast lesions. We recently demonstrated LRs in a fine needle aspirate of a benign breast cyst (7). Gupta and Panwar (4) also observed LRs in fine needle aspirates of cystic lesions of the breast in 5 cases, in 3 of which the rings caused mammographic opacity. We report these mysterious rings in a background of a foreign body reaction to suture material in breast tissue. LRs have never been reported in association with a malignant breast lesion, but their existence does not rule out malignancy.

LRs can be confused with ova, larvae or adult parasites, laminated calcifications, collagenous spherules, corpora amylacea, Michaelis-Guttman bodies (iron and calcium), hyaline globules, keratin, amyloid and mucin deposits (1,2,5,6,9). However, the characteristic laminated appearance with a double-layered wall and

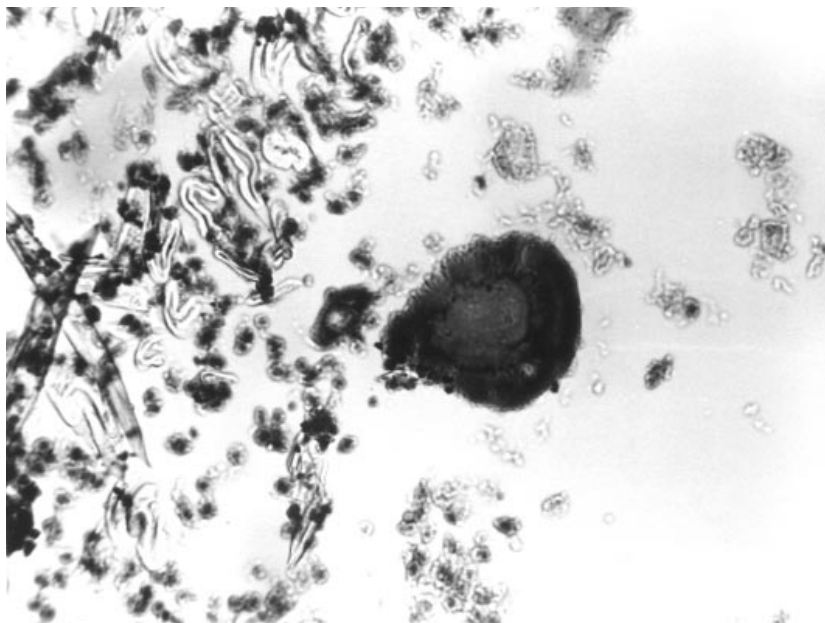


Figure. Liesegang ring with a laminated structure and radial cross-striations near the birefringent suture material (Hematoxylin-Eosin, x 400).

radial cross-striations is useful for a correct diagnosis. They can also be distinguished from parasites and ova by their greater variation in size (9). In collagenous spherulosis, myoepithelial cells surround the spherules, which may have a laminated fibrillary appearance (8,9).

In conclusion, LRs are rarely found in benign cystic or inflammatory breast lesions. To observe LRs as a component of a tissue reaction to suture material is an interesting finding. Pathologists should be aware of their

presence and varied morphology in order to avoid a misdiagnosis of parasitic lesions.

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