Case Report

Liesegang Rings in Xanthogranulomatous Pyelonephritis: A Case Report

Karla Laís Pegas,1 Maria Isabel Edelweiss,1 Eduardo Cambruzzi,2,3 and Cláudio Galleano Zettler2

1 Hospital de Clínicas de Porto Alegre, RS, Brazil
2 Universidade Luterana do Brasil, RS, Brazil
3 Hospital Nossa Senhora da Conceição, Av. Francisco Trein, 596, Laboratório de Patologia, 2º andar B. Cristo Redentor, Porto Alegre, Rio Grande do Sul, Brazil

Correspondence should be addressed to Karla Laís Pegas, lfp.voy@terra.com.br

Received 6 August 2009; Accepted 14 October 2009

Academic Editor: Helen Liapis

Copyright © 2010 Karla Laís Pegas et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Liesegang rings are concentric noncellular lamellar structures, rarely seen in vivo, occurring as a consequence of the accumulation of insoluble products in a colloidal matrix. These characteristic structures are a rare phenomenon usually found in association with cystic or inflammatory lesions and may be mistaken for parasites. The authors examined Liesegang rings from an inflammatory kidney lesion identified previously as a tumoral lesion on computerized tomography. On microscopic evaluation, Liesegang rings can be mistaken for eggs and larvae of parasites, psammoma bodies and calcification. Special stains like PAS, Grocott, von Kossa and Masson’s trichrome facilitate the diagnosis.

1. Introduction

Liesegang rings are laminated precipitation structures well recognized in the field of chemistry, occurring as a consequence of the rhythmic accumulation of sub- and supersaturation of insoluble products in a colloidal matrix, which precipitate by diffusion resulting in characteristic precipitation rings. They are recognized only rarely in vivo, arising in association with cystic or inflammatory processes. Clinically reported cases have been described most frequently in the kidney and can be mistaken for parasitic infestations. Other reports include paranasal sinus, breast, eye and peritoneum [1–5].

The rings are characterized by peripheryal concentric layers with radial cross-striations that surround an amorphous, central core. They are usually spherical but can vary in shape and size from 5 nm to 820 nm. Concentric laminated morphology can be accentuated with papanicolaou, hematoxylin-eosin, Diff-Quick, Masson’s trichrome, von Kossa and Gram stains [6–10]. In the present study, the authors describe Liesegang rings associated with xanthogranulomatous pyelonephritis.

2. Case Report

A 51-year-old woman was admitted to the hospital complaining from pain in the left upper quadrant of the abdomen for the last month. The abdominal computerized tomography showed a nodular tumor-like lesion on the upper left pole of the kidney. Partial nephrectomy was performed. The surgical specimen weighted 78,0 g and measured $5.5 \times 4.5 \times 2.5$ cm. On gross examination, there was a poorly circumscribed yellow soft nodule with central degeneration, measuring $3.0 \times 2.0 \times 2.0$ cm.

Microscopically there was a suppurative chronic interstitial nephritis with a lymphoid and neutrophilic infiltrate, central necrotic zone surrounded by foamy macrophages and giant multinucleated cells, tubular atrophy, periglomerular fibrosis and global glomerular sclerosis. The inflammatory
process has extended to the medulla and perinephric fat. Next to the central necrotic zone were several spherical laminated rings admixed with macrophages (Figure 1). These ring-like laminated structures resembled psammoma bodies or an ova of a parasite. The rings had an amorphous, central core surrounded by a double layered wall, accentuated with PAS (Figure 2) and negative von Kossa, Grocott and trichrome stains. Under polarized light the rings were nonbirefringent. The findings were diagnostic of xanthogranulomatous pyelonephritis with Liesegang rings.

3. Discussion

Liesegang rings are concentric noncellular structures, occasionally found in the kidney, synovium, conjunctiva, and eyelid. These lesions are spherical to elongated rings formed in cysts, fibrotic tissue, hemorrhagic zones, inflammatory processes and in necrotic areas, and result from a progressive deposition of organic substances, with an unclear pathogenesis. These peculiar ring-like structures range in size from 5 to 820 microns. Most had a double-layered outer wall with equally spaced radial cross-striations and an amorphous central nidus. They are nonpolarizable. In the present study, Liesegang rings were associated with a chronic inflammatory lesion, necrosis and degenerative changes. The characteristic laminated appearance with a double-layered wall, radial cross striations is characteristic and essential for accurate diagnosis [6, 7, 9, 12–14].

The exact composition of the Liesegang rings is not fully understood. Immunohistochemical and histochemical stains for calcium (von Kossa), iron, mucopolysaccharide, amyloid, glycogen, keratin and epithelial membrane antigen are negative. Special stains, radiographic analysis or scanning electron microscopy revealed that some Liesegang rings contained iron, silicon and sulfur. According to Tuur et al. Liesegang rings contain Ca++ besides other inorganic anions, organic polycations and organic polyanions [1]. They have been confused with various parasites, algae, calcification, corpora amylacea, psammoma bodies and the spheroid type of amyloid. Some pathologists have mistaken Liesegang rings for ova, larvae, or adults of the giant kidney worm, *Dioctophyma renale*. The latter is a large blood-red nematode that infects a variety of fish-eating mammals. The adult worms are usually expelled by the uretra and are probably the largest helmint to parasitize humans [6, 7, 10, 12, 15, 16].

4. Conclusion

Liesegang rings are a rare histological finding of some inflammatory diseases like xanthogranulomatous pyelonephritis. Pathogenesis remains unclear but it is important to recognize the characteristic features of Liesegang rings to avoid mistaking these with parasites.

References

[1] S. M. Tuur, A. M. Nelson, D. W. Gibson, et al., “Liesegang rings in tissue: how to distinguish Liesegang rings from the giant kidney worm, *Dioctophyma renale*,” *American Journal of Surgical Pathology*, vol. 11, pp. 598–605, 1987.
[2] N. Sneige, J. G. Batsakis, R. A. Hawkins, and H. P. Doble, “Pseudoparasitic (Liesegang) bodies in paranasal sinus,” *Journal of Laryngology and Otology*, vol. 102, no. 8, pp. 730–732, 1988.
[3] N. Sneige, R. H. Dekmezian, E. G. Silva, J. Cartwright Jr., and A. G. Ayala, “Pseudoparasitic (Liesegang) structures in perirenal hemorrhagic cysts,” *American Journal of Clinical Pathology*, vol. 89, no. 2, pp. 148–153, 1988.
[4] K. Gavin, N. Banville, D. Gibbons, and C. M. Quinn, “Liesegang rings in inflammatory breast lesions,” *Journal of Clinical Pathology*, vol. 58, no. 12, pp. 1343–1344, 2005.
[5] J. Krueger, T. Corwin, R. Corwin, and M. Saboorian, “Liesegang bodies in a solid renal mass: misdiagnosis as parasitic ova,” *Journal of Urology*, vol. 163, no. 2, pp. 540–541, 1992.

[6] T. E. Yusuf and M. J. Levy, “Endoscopic ultrasound diagnosis of Liesegang rings,” *Endoscopy*, vol. 38, p. 658, 2006.

[7] S. Banu, T. Canda, and O. Harmancioglu, “Liesegang rings in breast tissue: an unusual component of a foreign body reaction,” *Turkish Journal of Medical Sciences*, vol. 14, pp. 191–193, 2004.

[8] M. Odonera, Y. Sato, H. Ikeda, et al., “Biliary deposition of Liesegang rings presenting as a polypoid mass in the liver: previously unrecognized lesion,” *Pathology International*, vol. 59, no. 8, pp. 577–582, 2009.

[9] A. Santos-Briz, R. Serrano, P. P. Agustin, et al., “Liesegang rings in a dermoid cyst of the floor of the mouth: report of a case with cytologic findings,” *Acta Cytologica*, vol. 44, no. 6, pp. 1062–1065, 2000.

[10] M. Scivetti, A. Lucchese, V. Crincoli, G. P. Pilolli, and G. Favia, “Confocal laser scanning microscopy of Liesegang rings in odontogenic cysts: analysis of three-dimensional image reconstruction,” *Ultrastructural Pathology*, vol. 33, no. 2, pp. 48–51, 2009.

[11] R. E. Liesegang, “Über einige eigenschaften von gallerten,” *Naturwissenschaft Wochensch*, vol. 11, pp. 353–362, 1896.

[12] L. B. Katz and H. Ehya, “Liesegang rings in renal cyst fluid,” *Diagnostic Cytopathology*, vol. 6, no. 3, pp. 197–200, 1990.

[13] R. K. Gupta, A. G. R. McHutchison, and R. Fauck, “Liesegang rings in a needle aspirate from a breast cyst,” *Acta Cytologica*, vol. 35, pp. 700–702, 1991.

[14] D. A. Schwartz and H. J. Bellin, “Liesegang rings developing within intraperitoneal endometriotic implants,” *The Journal of Reproductive Medicine*, vol. 36, pp. 403–406, 1991.

[15] Y. Yoshiko, K. Ryuji, and T. Setsuo, “Liesegang rings developed in pyrophyllitic ore deposit, shokozan region, Hiroshima Prefecture,” *Journal of the Clay Science Society of Japan*, vol. 38, pp. 83–90, 1998.

[16] N. Kumar and S. Jain, “Liesegang rings in cytologic samples accompanied by calcium oxalate-like crystals: a report of three cases,” *Acta Cytologica*, vol. 44, no. 3, pp. 429–432, 2000.