Know the Field

Rushton bodies

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Abstract Rushton bodies (RBs) are hyaline bodies found in epithelial lining of the odontogenic cysts that appear as peculiar, eosinophilic, straight or curved, irregular or rounded, polycyclic glassy structures occurring with variable frequency in the epithelial lining of odontogenic cysts. This article depicts the various shapes and amusing staining properties of RBs along with a brief cognizance about their much-debated origin.

Keywords: Hematoxylin and eosin, Masson's trichrome, Rushton bodies

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RUSHTON BODIES

Rushton bodies (RBs) were originally observed by Dewey (1918) as hyaline bodies and mentioned in literature by Lund in 1924.[1] However, they were described in detail by Rushton (1955) as hyaline bodies found in epithelial lining of the odontogenic cysts that appear as peculiar, eosinophilic, straight or curved, irregular or rounded, polycyclic glassy structures occurring with variable frequency in the epithelial lining of odontogenic cysts.[2]

Published studies suggest an incidence of 10% in radicular cysts followed by dentigerous cyst (4%–10%) and odontogenic keratocysts (7%).[2] Although these are restrictedly expressed in odontogenic cysts, one case of plexiform ameloblastoma was reported by Takeda *et al.* in 1985. Present case demonstrates the presence of RBs in the radicular cyst. [Figures 1-3]. [3]

MORPHOLOGY

Rushton described hyaline bodies in three different morphologic patterns as linear, straight, or curved into various figures, often in a double strip as if an oval has been completely flattened with a little granular material at its center or like a hairpin [Figure 1], some resembling broken up pieces of plate and lastly circular or polycyclic agglomerations which are occasionally laminated.[2]

ORIGIN

A series of theories have been contemplated regarding the origin of RB. However, the origin of these hyaline bodies remains unsolved.

Odontogenic epithelial origin

Rushton (1955) and Wertheimer (1962) suggested through their analysis that these hyaline bodies resembled secondary enamel cuticle of Gottlieb and keratin or keratin-like substance.[1,4] Kulkarni *et al.* found RBs to be similar to dental cuticle but different from keratin.[5] Philippou *et al.* in 1990 put forward/suggested that hyaline bodies are a product of odontogenic cyst epithelium.[6]

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Morgan and Johnson and Allison concluded that hyaline bodies are formed as a consequence of consecutive secretory effect/activity of odontogenic epithelium.[7,8]

Hematogenous origin

Bouyssou and Guilhem and Sedano and Gorlin believed that RBs are derived from the thrombi in the varicose venules as they exhibited histochemical reactivity for hemoglobin.[9,10] Hodson (1966) proposed RBs to be composed of denatured hemoglobin following positive tannic acid phosphomolybdic acid (TP) A reaction.[1] El-Labban suggested RBs to be originating from degenerating red blood cells.[11] Browne and Matthews detected fibrinogen within the cores of some circular and polycyclic forms, suggesting their formation as reaction to extravasated serum.[12] However, Dent and Wertheimer refuted the hematogenous origin theory for RBs as they did not observe histochemical reactions specific for hemoglobin.[13]

Both odontogenic and hematogenous origin

Sakamoto *et al.* demonstrated that RBs are amyloids that are formed due to unusual alteration of the epithelial differentiation, providing hair keratin and the other is hemorrhage to provide hemoglobin, thus concluding that both are required for the genesis of hyaline bodies.[14] However, they did not comment on the origin.

Neither odontogenic epithelium nor hematogenous origin

Ultrastructural studies by Jensen and Erickson did not support the odontogenic epithelial or hematogenous origin for RBs.[15]

STAINING PROPERTIES OF RUSHTON BODIES

RBs take up Gram-negative stain. They give positive

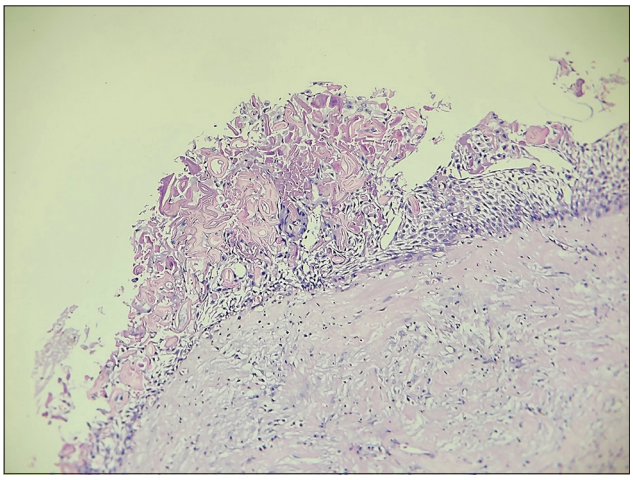

Figure 1: Photomicrograph showing Rushton bodies of linear, circular and lamellated pattern as acellular, eosinophilic structures in the epithelial lining of the radicular cyst (×4)

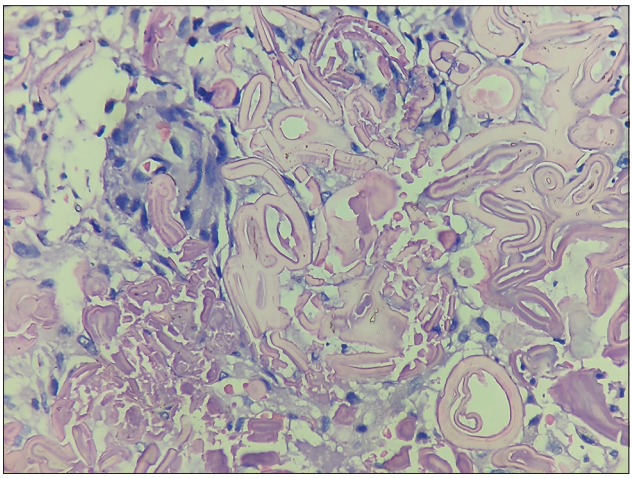

Figure 2: Hematoxylin and eosin-stained Rushton bodies (×10)

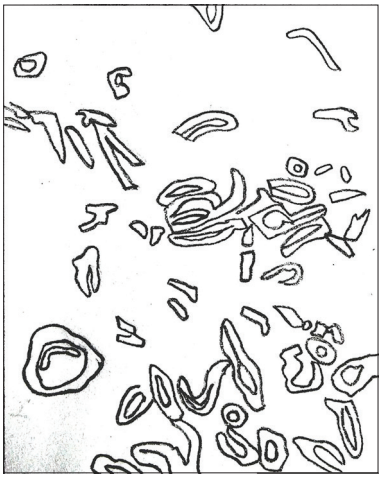

Figure 3: Corresponding hand drawn illustration of Rushton bodies

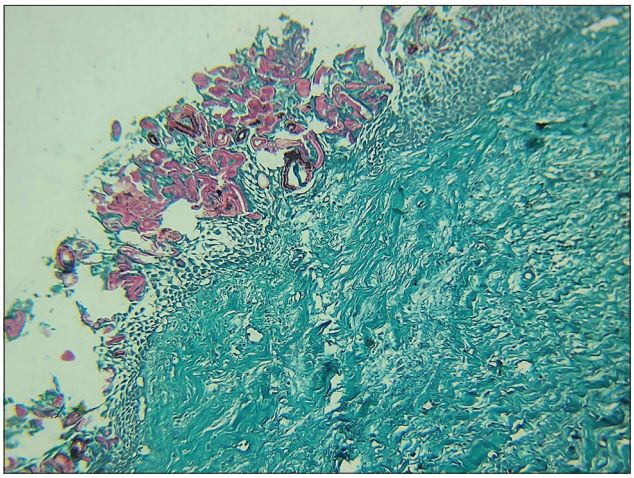

Figure 4: Dark pink-stained Rushton bodies showing characteristic hairpin-like structure stained with Masson's trichrome stain (×10)

reaction with various stains such as Prussian blue (pale to strong reaction), aldehyde fuschin (positive after oxidation with permanganate), combined aldehyde fuschin-alcian blue method (strong purple), TPA-amido black (light blue to black), Papanicolaou stain (orange G), Masson's trichrome (dark pink) [Figure 4], Weigert's elastin solution, orcein, modified Mallory's stain for keratin, rhodamine B, thioflavin T and Congo red. RBs stain negatively with Von Kossa's method for calcium and periodic acid–Schiff method for mucopolysaccharides.[16]

IMMUNOHISTOCHEMICAL CHARACTERISTICS

They show positivity for hair keratin, keratin 17 and hemoglobin α-chain. They appear blackish brown and refractile on staining with CD44.[16]

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Jacob S. Rushton bodies or hyaline bodies in radicular cysts: A morphologic curiosity. Indian J Pathol Microbiol 2010;53:846-7.
2. Rushton MA. Hyaline bodies in the epithelium of dental cysts. Proc R Soc Med 1955;48:407-9.
3. Takeda Y, Kikuchi H, Suzuki A. Hyaline bodies in ameloblastoma: Histological and ultrastructural observations. J Oral Pathol 1985;14:639-43.
4. Wertheimer FW, Fullmer HM, Hansen LS. A histochemical study of hyaline bodies in odontogenic cysts and a comparison to the human secondary dental cuticle. Oral Surg Oral Med Oral Pathol 1962;15:1466-73.
5. Kulkarni M, Agrawal T, Dhas V. Histopathologic bodies: An insight. J Int Clin Dent Res Organ 2011;3:43-7.
6. Philippou S, Rühl GH, Mandelartz E. Scanning electron microscopic studies and X-ray microanalysis of hyaline bodies in odontogenic cysts. J Oral Pathol Med 1990;19:447-52.
7. Morgan PR, Johnson NW. Histological, histochemical and ultrastructural studies on the nature of Hyalin bodies in odontogenic cysts. J Oral Pathol 1974;3:127-47.
8. Allison RT. Microprobe and microradiographic studies of Hyalin bodies in odontogenic cysts. J Oral Pathol 1977;6:44-50.
9. Bouyssou M, Guilhem A. Morphological and histochemical research on Rushton's intracystic Hyalin bodies. Bull Group Int Rech Sci Stomatol 1965;8:81-104.
10. Sedano HO, Gorlin RJ. Hyaline bodies of Rushton. Some histochemical considerations concerning their etiology. Oral Surg Oral Med Oral Pathol 1968;26:198-201.
11. El-Labban NG. Electron microscopic investigation of Hyaline bodies in odontogenic cysts. J Oral Pathol 1979;8:81-93.
12. Browne RM, Matthews JB. Intraepithelial Hyaline bodies in odontogenic cysts: An immunoperoxidase study. J Oral Pathol 1985;14:422-8.
13. Dent RJ, Wertheimer FW. Hyaline bodies in odontogenic cysts: A histochemical study for hemoglobin. J Dent Res 1967;46:629.
14. Sakamoto K, Khanom R, Hamagaki M, Yamaguchi A. Ectopic production of hair keratin constitutes Rushton's hyaline bodies in association with hematogenous deposits. J Oral Pathol Med 2012;41:637-41.
15. Jensen JL, Erickson JO. Hyaline bodies in odontogenic cysts: Electron microscopic observations. J Oral Pathol 1974;3:1-6.
16. Babburi S. Rushton bodies: An update. J Clin Diagn Res 2015;9:ZE01-3.