MORPHOLOGY AND COMPOSITION OF A PEDIATRIC SIALOLITH: AN ELECTRON MICROPROBE AND RAMAN SPECTROSCOPY INVESTIGATION

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The term sialolithiasis refers to the formation of crystallized particles known as salivary calculi or sialoliths in the submandibular gland and in the glandula parotis, especially in the so called Whartons's and Stensen's ducts, respectively. The etiology of these calculi is poorly known as well as the precise mechanism of their formation. However the most important factors controlling the development of sialoliths are: 1) presence of bacteria, 2) viscosity and pH of saliva, 3) anatomy of the Whartons's duct and 4) relatively high concentration of Ca in saliva. Therefore, characterization of morphology and chemical composition of the sialoliths is important to define the most appropriate medical treatment of the patients and to prevent further formation of sialolithiasis. Sialolothiasis is a common disease in middle-aged patients, affecting about 1.2 % of population. In children, this entity is rare and it is estimated that the pediatric population represents only 3% of all cases of sialolithiasis. The aim of this contribution was to investigate by electron microprobe and Raman spectroscopy a sialolith formed in the Whartons's duct of an 11 years old patient. The studied sialolith, about 2 mm in size, is white in color and has a rounded shape. It consists of a core composed of small particles (about 2 microns in size), containing S, Cl, P, K, Ca and Na (only qualitatively analyzed), rimmed with a phase of Ca, P and O (only semi-quantitatively analyzed). This compound is banded like agates and shows a zoning of several thin layers, few microns across, characterized by different distribution among Ca, P and O. It also forms crystalline and mammillary aggregates and botryoidal clusters of radiating crystals. The phase contains Cl and S, up to 0.26 and 0.53 wt%, respectively. F content is negligible, ranging between 0 and 0.11 wt%. REE, U and Th, that generally can be detected in apatite occurring in natural rocks, are absent in the analyzed sialolith. Based on the semi-quantitative analyses, it was not possible to classify whether the compound is apatite or brushite, isoclasite and monetite. Therefore, we analyzed it using Raman spectroscopy. The obtained spectrum shows no discernible scattering bands over the range of 150–2000 cm_1, but its shape indicates a fluorescence effect, suggesting that the studied compound is an amorphous or poorly crystalline phase.

Keywords: sialoliths, microprobe, Raman