LETTERS TO THE EDITOR

Rare kidney stones

Cálculos renales raros

Dear Editor,

Kidney stones can be classified, generally, into categories or types that reflect both the composition (macro- and micro-components) and the microstructure, and that can be correlated with the specific pathophysiologic conditions of their development. However, when studying a large number of patients, rare kidney stones often occur, which do not correspond with any type previously described, like the cases presented, arising in the population of the island of Mallorca. In this situation, in order to be able to establish the etiology of the calculus, a comprehensive study is required, ranging from the clinical aspects and lifestyle habits of the patient and the urine and plasma biochemistry, to the detailed study of the calculus. The characterization of these calculi was performed by means of their study with stereoscopic microscopy, the study and analysis by means of scanning electron microscopy coupled with microanalysis by means of energy dispersive X-ray spectrometry, and analysis by means of Fourier-Transform Infrared spectrophotometry (FTIR).

The first one was a 50-year-old man who had left flank pain attributable to colic, without a prior history of kidney lithiasis or any other major medical problems, treated using percutaneous nephrolithotomy. He formed over 30 small calculi, with a central core containing silicon and hydroxyapatite, with outer layers of crystals of calcium oxalate monohydrate (COM) in compact columnar structure (Fig. 1). These calculi develop from a characteristic nest composed of particles mainly of organic matter, uric acid, or hydroxyapatite, formed in the urine and retained within the upper urinary tract. Urolithiasis consisting exclusively or partly of silicon is rare and it is usually associated with the use of magnesium trisilicate as antacid. However, the patient (not treated with antacids) was a welder, and he possibly inhaled silicon vapor daily using the typical welding bars rich in silicon. The urinary biochemical analysis revealed the presence of hypercalciuria and hypocitraturia, which explains the development of COM crystals calculi around the central core of silicon.

Figure 1  Case 1. (A) Lithiasis with white central core (stereoscopic microscopy). (B) Organic matter with abundant silicon (arrow 1) and hydroxyapatite (arrow 2) (scanning electron microscopy).

The second one is a 40-year-old man who had experienced spontaneous expulsion associated with renal colic of a calculus of about 1.5 mm in diameter. This calculus had typical organic matter, but with a very rare crystal structure (Fig. 2A). The analysis using infrared spectrophotometry conclusively showed that the calculus consisted of calcium sulphate. The formation of this type of calculi must be associated with a high intake of sulphate and its subsequent urinary excretion, although it was not possible to investigate this use by the patient. However, the urinary

biochemical analysis revealed no alteration in the common urine parameters.

The third case is a 42-year-old woman who presented with several renal colics with spontaneous expulsion. Only the dose of Roaccutane® referred (anti-acne treatment) three years prior to renal colic. The biochemical analysis, carried out a few months after the expulsion of the calculus, revealed a high concentration of calcium, being the remainder of the normal parameters, including magnesium excretion. The study of these calculi using scanning electron microscopy shows a disordered internal structure, with presence of spherulites. The Energy Dispersive X-Ray Analysis showed that there are regions rich in Ca, Mg, O, P, and C, while in others Ca, Mg, O, and C were detected or there are even areas where only Mg, C, and O were detected. In one of the inner regions, the presence of crystals of calcium oxalate monohydrate could be seen quite clearly (Fig. 2B), which makes it possible to rule out that they are artifacts. The infrared spectrum of these calculi showed that the majority component corresponded to magnesium carbonate. Magnesium carbonate calculi have been described in cervids, but in humans only the possibility that the magnesium carbonate is in some case associated with calcium carbonate has been pointed out.

In conclusion, although the majority of kidney calculi correspond to well-defined types and can be easily classified, few of them (about 1% of the total) show some very unusual features. However, the proper study of such calculi can provide important information on the etiology.

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References


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