Cholesterol Crystal Embolization

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Cholesterol crystal embolization, also called atheroembolism or atheroembolic renal disease, is still an underdiagnosed entity. Atheroembolic renal disease is caused by cholesterol crystals from an atherosclerotic aorta and is a particularly severe ulcerated plaque atherosclerosis that occludes small renal arteries. The kidney is frequently involved because of the proximity of the renal arteries to the abdominal aorta. Cholesterol crystal embolization can also occur in many anatomic sites, including skin, liver, heart, pancreas, gastrointestinal tract, spleen, prostate, penis, testes, bladder, spinal cord, intracerebral vessels, retina, subcutaneous tissue, and skeletal muscle. Therefore, cholesterol crystal embolization has been considered a multisystemic disease [1–3].

Although cholesterol crystal embolization can occur spontaneously (in around 20% of the cases), it characteristically appears after an invasive vascular procedure, such as manipulation of the aorta or other large arteries during arteriography, angioplasty, or surgery. It can also occur after anticoagulant and thrombolytic treatment. The same risk factors as for atherosclerosis, such as male sex, age >60 years, white race, arterial hypertension, diabetes mellitus, and tobacco use, have been also identified as risk factors for the development of cholesterol crystal embolism [2].

Although the diagnosis of renal atheroembolic disease is difficult, the presence of a classical triad, characterized by a precipitating event (vascular intervention or procedure), acute or subacute or chronic renal failure, and peripheral cholesterol crystal embolization (particularly cutaneous manifestations, such as digital mottling and nail pulp infarcts, livedo reticularis, purple toes, and gangrene of toes), strongly suggests this disease. Biopsy of the skin or the kidney demonstrates cholesterol crystals, biconvex, needle-shaped clefts within the occluded vessel. These intraluminal lesions are often accompanied by a perivascular inflammatory reaction that may contain eosinophils [2].

The reported incidence of renal atheroembolic disease during the last 10 years seems to have increased by several reasons, such as the increased longevity of patients with atherosclerotic vascular disease that may explain the increase in the number of invasive vascular procedures and the generalized use of anticoagulants and thrombolytics [3]. In fact, cholesterol crystal embolism has been described not only in native kidneys, but also in renal allografts and in dialysis patients [1].

Piccoli et al. [4] present in this issue cholesterol crystal embolism in 6 dialysis patients, the largest experience published [4]. All patients had severe atherosclerosis, 5 had ischemic heart disease, and 4 patients had received a renal transplant, 1 of them three grafts. Interestingly, in 3 cases a precipitating factor was present, and in the other 3 patients cholesterol crystal embolization developed spontaneously. Skin manifestations were the key for the diagnosis, particularly livedo reticularis and necrotic lesions in legs, toes, and feet. Notably, steroid treatment (with prostaglandin analogs in 4 cases) was successful in the short term, although 1 patient died of sepsis, and another needed amputation performed over the knee 6 months later.

From this interesting article, several points of interest should be considered. First, cholesterol crystal embolization is also a potential complication in dialysis patients,
particularly in hemodialysis patients. Second, the diagnosis of this syndrome in dialysis patients is difficult, because renal abnormalities are absent. However, cholesterol crystal embolization should be suspected in dialysis patients with severe atherosclerosis who present with new cutaneous lesions after an invasive vascular procedure or recent onset of anticoagulant therapy, as commented above. Also, this picture may spontaneously appear without precipitating factors in these severe atherosclerotic patients. Therefore, to be alert to the presence of new skin lesions in such patients is mandatory, and the differential diagnosis should be made on the basis of vascular obstruction and systemic vasculitis. Because skin biopsy is contraindicated in case of necrotic lesions, the diagnosis of cholesterol crystal embolizations in dialysis patients could be supported by clinical grounds. Possibly, for these diagnostic difficulties the true incidence of cholesterol crystal embolism in dialysis patients may be underestimated. Third, this entity has been described in older people, but this article shows that patients <60 years of age having severe atherosclerosis can also develop this condition. Because we include patients >75–80 years of age as well as younger patients with previous transplants, probably all with important atherosclerosis, in dialysis therapy, the incidence of cholesterol crystal embolism in this patient population may increase in the next years.

Another interesting point to consider is the influence of steroid treatment, associated or not with prostaglandin analogs [5], on the clinical course. Although this is a controversial topic, 4 patients improved after treatment was started. Consequently, Piccoli et al. [4] suggest that early diagnosis and therapy may improve the clinical course of cholesterol crystal embolization in these patients.

Finally, more knowledge is needed to establish guidelines for the diagnosis and therapy of this severe disease in dialysis patients. However, until this information is available, the experience published here will be very useful.

References