A 72-year-old Slovakian woman was referred to our Heart Center for aortic valve replacement because of severe aortic stenosis. Her medical history revealed arthralgia and bilateral hip replacement. She reported shortness of breath on exertion. Physical examination revealed aortic valve stenosis. Besides a mild anemia (hemoglobin 7.6 mmol/L), the results of routine laboratory tests were normal. Transthoracic echocardiography revealed left ventricular hypertrophy, normal left ventricular function, and a severe aortic valve stenosis with a mean aortic valve gradient of 80 mm Hg and a calculated aortic valve area of 0.6 cm². Cardiac catheterization showed a stenosis of the left descending artery. A routine aortic valve replacement using a biological prosthesis (Perimount Magna Ease) and single-vessel aortocoronary artery bypass grafting were performed.

Interestingly, a black sternum was found after sternotomy, and, when the aortic valve was resected, it was bluish-black (Figures 1 and 2). The pericardium was remarkable. Alkaptonuric ochronosis was suspected. Alkaptonuric ochronosis, an autosomal recessive trait, is caused by a deficiency of homogentisic acid oxidase that results in black discoloration of cartilaginous and other tissues.1–4 Sites of deposition are the aortic valve, mitral valve and mitral anulus, pericardium, mural endocardium, pulmonary valve, and regions of replacement fibrosis.5 There is no treatment for alkaptonuric ochronosis, although nitisinone inhibits the enzyme that produces homogentisic acid.1,2 Therapy with vitamin C to increase homogentisic acid degradation is not effective.6 Aside from certain areas of Slovakia and the Dominican Republic, alkaptonuria is a rare condition.

Only in rare cases, alkaptonuric ochronosis causes valvular heart disease. Extensive extracellular deposits of ochronotic pigment in the aortic valve may serve as a stimulus for dystrophic calcification. Accumulation of this pigment can lead to an inflammatory reaction and to progressive valve dysfunction. An increasing incidence at higher age is reported. The mean age of cardiac valve involvement is 54 years.1 Patients with alkaptonuric ochronosis usually present at young age with black urine: alkaptonuria. Therefore, diagnosis of alkaptonuric ochronosis at the time of aortic valve replacement surgery is unique. Potentially, in our case, the hip replacement surgeries could have led to an earlier diagnosis. However, orthopedic reports were not available, neither in the referral nor in the referred center. Therefore, the black sternum and bluish-black aortic valve were a surprising finding during cardiac surgery.

Postoperatively thorough physical examination revealed waxlike ears, a common finding in these patients. Pathological examination of the explanted native aortic valve showed numerous dark-pigment macrophages, typical for ochronosis. Furthermore, urine homogentisic acid levels were 1116 µmol/mol creatinine (severely increased). The patient had a normal postoperative recovery.

This case indicates that a black sternum and a bluish-black aortic valve can serve as a first clue of alkaptonuric ochronosis, particularly in patients without black urine.

Disclosures
None.

References
**Figure 1.** Bluish-black aortic valve.

**Figure 2.** Bluish-black aortic valve before replacement.
Mending a Darkened Heart: Alkaptonuria Discovered During Aortic Valve Replacement
Mark J. Schuuring, Ben Delemarre, Ali M. Keyhan-Falsafi and Ivo A. van der Bilt

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