Case Report

Coronary Artery Stenting in a Patient With Progeria

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Progeria syndrome is a very rare disease with early demise in the second decade due to cardiovascular disease. Most events are sudden and fatal, leaving no time for medical or interventional therapies; no such interventional therapy has been reported. We present a 13 years old boy who previously had suffered from dissection of both internal carotid arteries; he now presented with exercise-induced angina. Both CT-scan and angiography revealed severe stenotic lesions at the origin of the right coronary artery and left anterior descending artery, typical for dissection. Coronary artery stenting resolved the symptoms. © 2016 Wiley Periodicals, Inc.

Key words: premature ageing syndrome; cardiovascular disease; endovascular treatment

INTRODUCTION

Progeria is a very rare (1 per 4×10^6) genetic premature ageing syndrome. Typical physical findings include delayed growth with short stature, low body weight, thin, parchment-like skin, loss of scalp hair, and lipodystrophy which causes a very typical facial appearance. It is most commonly caused by an autosomal dominant mutation on chromosome 1 in the gene coding for Lamin A (LMNA-gene). The mutation leads to a mutant form of Lamin A, called Progerin, which causes nuclear instability, alterations in chromatin structure and gene expression, hence leading to an accelerated ageing process and death at a young age. The mean age of survival is 12.6 years with cerebral and coronary occlusions being the leading cause of demise, usually sudden [1].

Although cardiovascular disease is the number one cause of death in this population, reports on catheterization and/or coronary artery stenting are extremely rare, if not non-existing. A search on Pubmed on "progeria or Hutchinson–Guilford and percutaneous coronary intervention PCI" in march 2016 revealed no hits. We report a case of a 13-year-old boy with progeria syndrome (documented LMNA mutation) with severe stenosis proximal on two coronary arteries, which required coronary artery stenting with a good result.

CASE REPORT

Past history revealed that the patient experienced a cerebrovascular event at the age of nine. At that time a dissection of the right internal carotid artery was diagnosed as well as an old dissection of the left internal carotid artery; both vessels had the typical string sign from the bifurcation until intracranial. Two years later, at the age of 11, he had another transient ischemic episode.

He was treated with acetylsalicylic acid, L-thyroxin, pravastatine, and metformin; his last lab reports showed all parameters to be within normal range.

He presented at the age of 13 years with exercise-induced angina for 3 weeks. He was in good general condition with no signs of decompensation or distress. Baseline ECG showed a normal QRS-axis with no

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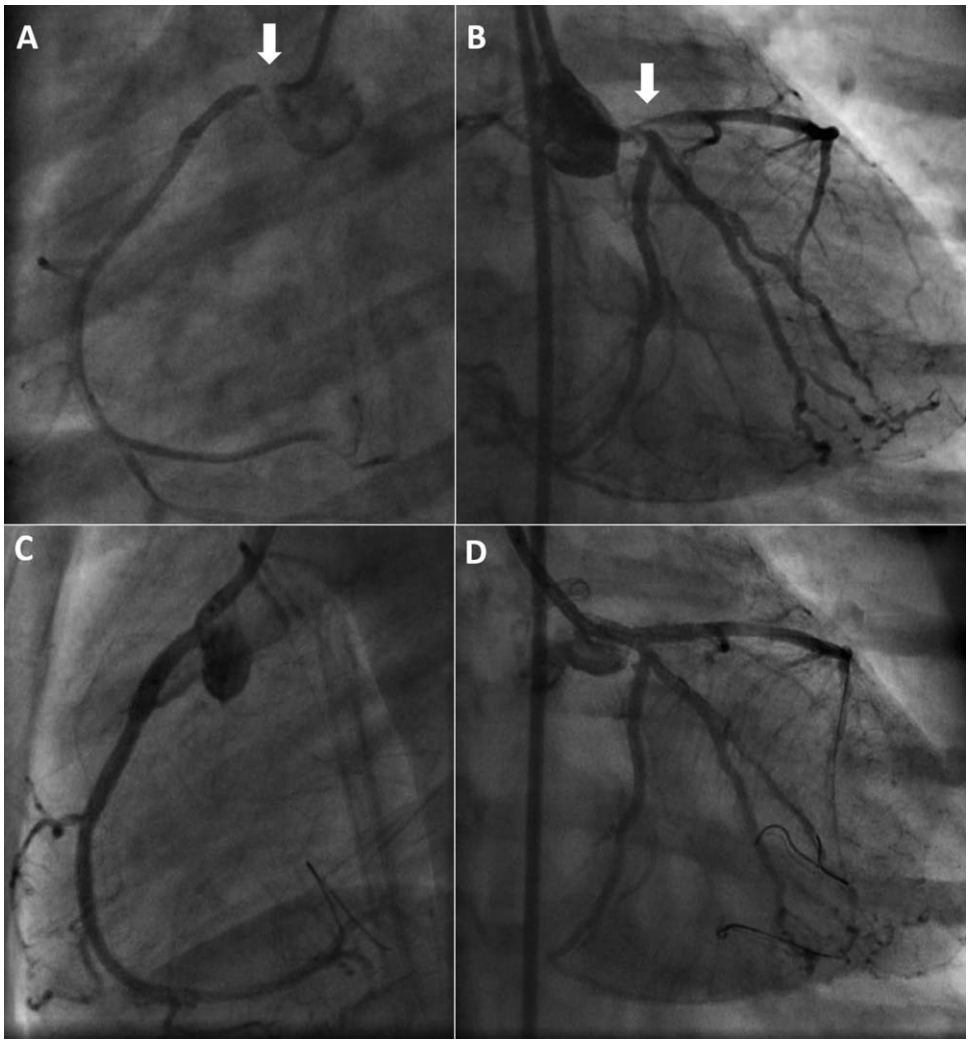

Fig. 1. Selective angiogram of RCA (A) and LCA (B) showing a subtotal occlusion of the vessel. Note absence of calcifications, and normal appearance of the remainder of the coronary arteries. After stent implantation good antegrade perfusion is restored.

signs of hypertrophy, but a strain pattern was present in lead III, V5, and V6. Echocardiography demonstrated normal biventricular function with moderate concentric left ventricle hypertrophy and mild mitral valve regurgitation. Exercise testing rapidly elicited clinical symptoms and ECG abnormalities. Coronary CT showed a marked localized stenosis proximal on the left anterior descending artery (LAD); the orifice of the right coronary artery was not visualized, but there was distal perfusion. There were no calcifications of the coronary walls.

The patient was scheduled for cardiac catheterization and PCI, and received a weight-adjusted (19.5 kg) loading dose of acetylsalicilyc acid (80 mg) and clopidogrel (60 mg or three times the maintenance dose) on the day prior to intervention.

The procedure was performed under general anesthesia. Due to the anesthetic risks in this population (mandibular hypoplasia, small mouth opening, abnormal dentition, decreased flexibility of neck and tempomandibular joints, skeletal contractures, and decreased neck mobility) it was decided not to intubate but to use a laryngeal mask airway (LMA). After vascular access was obtained with a 6-Fr micropuncture set (COOK, Bloomington, USA), 2,000 units of heparin were administered, after which another 1,000 units were given guided by ACT.

Coronary angiography revealed critical eccentric lesions just beyond the ostia of both the right coronary artery (RCA) and left anterior descending artery (LAD) (Fig. 1, arrows in panels A and B, respectively). All other coronary segments appeared normal, except for an extensively developed collateral circulation. Intravascular coronary imaging was not performed, shortening procedural duration and minimizing manipulations

and the risk for potential complications. Percutaneous coronary intervention (PCI) of the RCA was performed using a 6-Fr right 3.5 Judkins® guiding catheter (Cordis Corp., NJ) and a high-torque Pilot 50 0.014″coronary guide wire (Abbot, IL). After predilation with a 2.0 × 12 mm semi-compliant balloon, a 2.75 × 18 mm Resolute Onyx™ zotarolimus-eluting stent (Medtronic Inc, Minneapolis, MN) was implanted in the ostium of the RCA, slightly protruding into the sinus. Postdilation with a non-compliant 2.75 × 12 mm balloon was performed (20 atm), restoring full patency of the RCA (Fig. 1, panel C). Similarly, PCI of the LAD was performed using a 6-Fr extra back-up guide catheter and a Pilot 50 coronary guide wire. In this case, a Balance middle weight coronary guide wire (Abbot, IL) was used to increase support and protect the access to the Circumflex artery. Following predilation with the same 2.0 × 12 mm semi-compliant balloon, a 2.5 × 18 Onyx stent was implanted extending from the ostium of the left main coronary artery (LMCA) to the proximal LAD, and the latter segment was postdilated with a 2.5 × 12 non-compliant balloon (20 atm). To compensate for size mismatch in the LMCA, a proximal optimization technique was applied using a 3.0 × 8 mm non-compliant balloon (20 atm), restoring normal anatomy of the LMCA bifurcation (Fig. 1, panel D).

A platelet reactivity test was performed immediately after PCI using the VerifyNow system (Accumetrics, San Diego, CA), showing a therapeutic effect of aspirin (503 Aspirin Reaction Units (ARU)) but absent P2Y12 inhibitor effect (239 P2Y12 Reaction Units (PRU), 0% inhibition). After administration of an additional loading dose of clopidogrel (60 mg) followed by a maintenance dose of 40 mg/day, PRU dropped to 12 and P2Y12 inhibitory effect increased to 95%, well within the therapeutic range. Discharge from the hospital was possible the day after the procedure. He had become free of angina; exercise testing 3 months later documented good exercise tolerance free of coronary ischemia.

DISCUSSION

Progeria is a very rare syndrome, the symptoms however are very remarkable. One of the most striking features is premature obstruction of the blood vessels, leading to stroke or fatal myocardial infarction. In our patient, the symptoms of angina pectoris could easily be explained by the severely stenotic coronary lesions.

The nature of these lesions is not completely clear. Old reports [2] have described them as typical atherosclerosis with some plaques. More recent pathological reports however describe these lesions as progressive, fibrotic scarring of the arteries rather than the lipid-driven, chronic inflammatory changes typical of atherosclerosis [3]. Although it is tempting to consider the vascular lesions as typical atherosclerosis, the very acute incidents resemble more dissection: the lesions in this and other cases occurred just beyond the origin at points where vascular stress is the highest, the remainder of coronary arteries appear unaffected, there is rarely a clinical warning and thus no reports of percutaneous interventions; most children have a normal lipid profile receiving regular treatment. We believe that these children suffer from accelerated aging of the blood vessels evidenced by typical loss of smooth muscle cells and elastic fibers in the walls making them vulnerable for premature and easy dissection of the origin of carotid and coronary arteries. In contrast with typical adult atherosclerosis, calcification of vessel wall and plaques is rare or absent.

This case demonstrates that with proper precaution and preparation, good results can be achieved. Anesthesiologists were well prepared for this high-risk procedure, avoiding endotracheal intubation by using a laryngeal mask which is used routinely for percutaneous interventions in children in some centers. In the catheterization laboratory, care was taken to obtain vascular access with minimal damage and progressing wires and sheaths with minimal endovascular trauma to avoid further lesions like dissections.

CONCLUSION

Progeria is a rare disease with sudden occlusion of carotid and coronary arteries in the second decade, most frequently leading to sudden death. When symptomatic, early PCI can restore adequate coronary perfusion.

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