Coronary angiography showed the absence of significant atherosclerotic lesions. From the left anterior descending artery proximal and mid segments, a dual coronary artery fistula drained into the right ventricle (Fig. 1A). The underdeveloped right descending coronary artery presented another coronary artery fistula draining into the right ventricle (Fig. 1C). Both fistula paths were occluded by deploying 10 coils via radial access (Figs. 1B and D). Final results were good with no complications.

During her check-up after 8 weeks, the patient reported a clear improvement in functional class, having presented no further symptoms of angina despite receiving no anti-angina drugs other than 100 mg losartan/day for high blood pressure control for more than 6 years. She underwent control exercise testing, completing the Bruce protocol stage 3 and reaching 96% of MHR with neither electrical nor clinical changes. During a second stress echocardiograph test, she reached MHR in the maximum stage of 40 μg/kg/min without presenting electrical or echocardiographic changes.

A congenital coronary artery fistula is an abnormal communication between an epicardial coronary artery and a cardiac chamber or vascular structure located near the heart: 40% to the right ventricle, 25% right atrium, 15% to 20% pulmonary artery and 7% coronary sinus.[1] It is found in approximately 0.10% to 0.15% of coronary angiographies and most frequently affects the right descending coronary artery (60%).[1–3] It is usually found by chance with no identifiable associated symptoms, but symptoms do appear when the shunt is significant, fundamentally variable degrees of ischemia and of heart failure.[2]

Dual coronary artery fistulas affecting both coronary territories are extremely rare (5% of the total) and more frequently present phenomena of secondary coronary ischemia than of significant left-right shunt with phenomena of "coronary steal".[4] The percutaneous approach and coil deployment–which is less invasive and involves a shorter hospital stay–is the current method of choice.[2] In our case, it permitted symptom control with proven absence of inducible ischemia in the follow-up. Surgical closure is currently reserved for large multiple fistulas, which are generally diagnosed in childhood,[2] when different technical considerations need to be borne in mind.[3]

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Sandwich Stenting to Treat an Ostial Left Main Narrowing Following Transcatheter Aortic Valve Implantation

Implantación de stent *«en* sandwich*» para tratar una estenosis del* ostium *de la principal izquierda tras implantación de válvula aórtica percutánea*

To the Editor,

Transcatheter aortic valve implantation (TAVI) is becoming a feasible and effective therapeutic option in patients with severe symptomatic aortic stenosis at high risk for surgical aortic valve replacement (AVR). Despite being less invasive than conventional surgical AVR, TAVI is still associated with periprocedural complications including acute coronary obstruction.[1]

An 86-year-old woman with severe symptomatic aortic stenosis (peak gradient 100 mmHg, mean gradient 68 mmHg) presented to our institution with dyspnea (NYHA III) and rest angina (CCS 4) despite medical treatment. The patient was deemed to have a high surgical risk for AVR on the basis of age, general frailty, and the presence of a porcelain aorta, and was referred for transfemoral TAVI.

The procedure was performed as previously described.[2] Following implantation of a 23-mm Sapien XT (Edwards Lifesciences, Irvine, California) aortic bioprosthesis (Fig. 1A, video), the patient experienced acute hypotension with a blood pressure of 85/60 mmHg (Fig. 1B). Echocardiography showed severe left ventricular dysfunction without cardiac tamponade. Aortography excluded severe aortic regurgitation, aortic dissection, and aortic root rupture but left main coronary artery (LMCA) ostial obstruction was suspected (Fig. 1C), especially as the patient developed ST-segment depression in the precordial leads (Fig. 1D). The LMCA was engaged with a guiding catheter and angiography confirmed severe ostial narrowing, most probably due to displacement and obstruction by the calcific native valve leaflets. A coronary wire was advanced through the lesion (Fig. 2A) and a 3.5×12 mm Promus Element stent (Boston Scientific, Natick, Massachusetts) was implanted at the LMCA ostium. Subsequent coronary angiography revealed incomplete stent expansion, most likely due to acute stent recoil (Fig. 2B). Post-dilatation with a 3.5×12 mm noncompliant balloon showed good expansion of the balloon (Fig. 2C) but fluoroscopy again demonstrated dynamic recoil of the ostial part of the stent (Fig. 2D). We concluded that the stent did not have sufficient radial strength to push the bulky leaflet away from the ostium. Thus we decided to implant a 3.5×9 mm cobalt-chromium bare-metal stent within the first stent ("sandwich stenting") to increase the radial strength of the scaffold without doubling the drug dose (Fig. 2E). Following

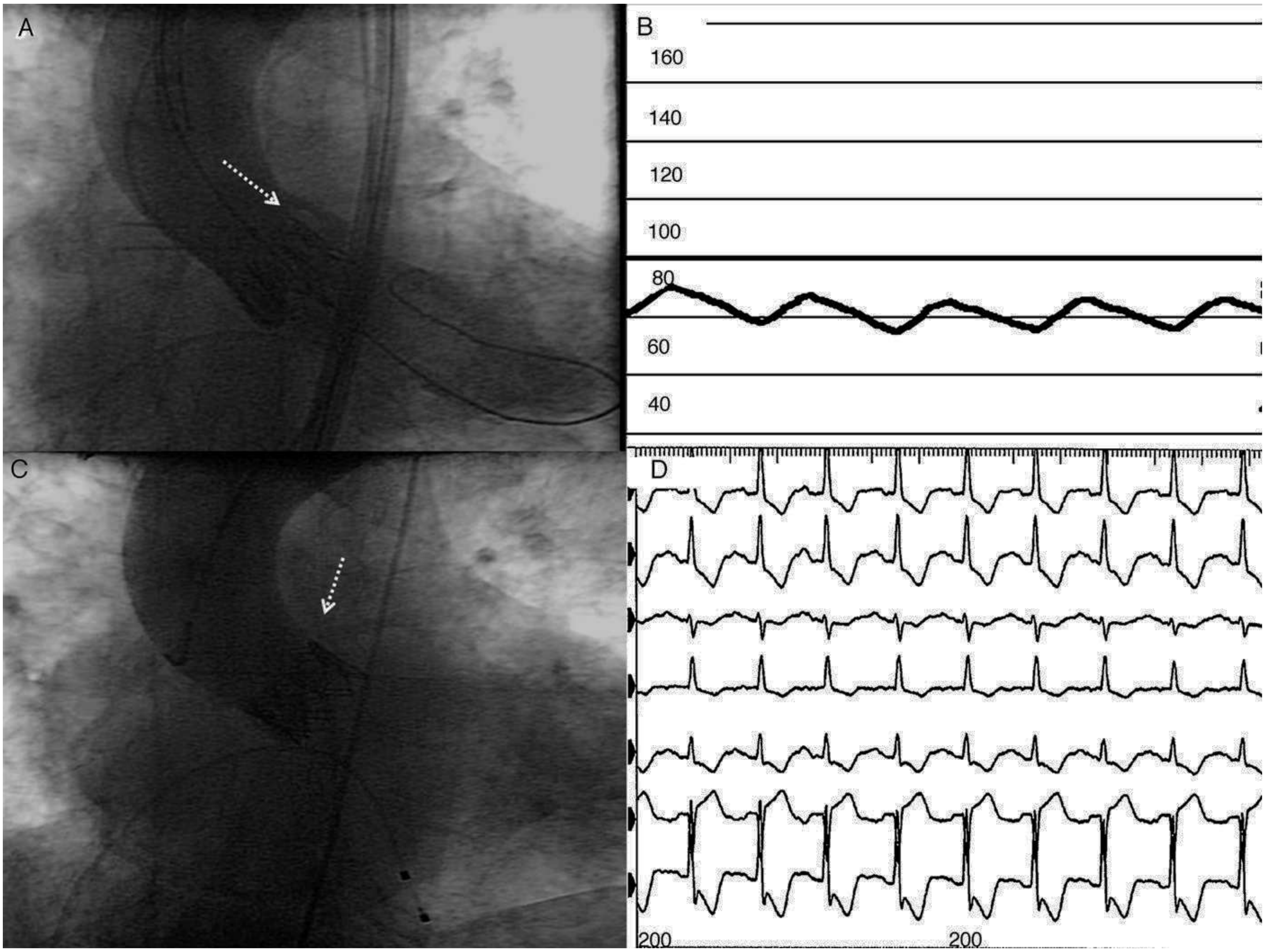

Figure 1. A: Aortic valve implantation; B: Evidence of severe hypotension; C: Aortogram excluding aortic regurgitation, dissection or rupture; D: Diffuse ST segment depression.

stent-in-stent implantation and postdilation with a 4.0 × 8 mm noncompliant balloon inflated at 26 atm, acceptable stent expansion was obtained (Fig. 2F) with hemodynamic and electrocardiographic normalization (Figs. 2G and 2H).

Coronary artery ostial obstruction is an uncommon but severe complication following TAVI.[1] Although rare, this event is potentially fatal as it can result in extensive myocardial ischemia. This was the first report of LMCA ostial obstruction from over 260 patients undergoing TAVI at our institution (0.4%). This complication can be related to procedural factors (inappropriately high positioning of the sealing cuff of an implanted valve or embolization of atheroma, calcium, thrombus or air) or anatomic features (narrow sinus of Valsalva, bulky leaflet calcifications, low-lying coronary ostia). These factors should be assessed preoperatively using multimodality imaging (echocardiography, aortography, and computed tomography) to allow appropriate procedural planning. Additionally, aortic root injection during the procedure (especially during balloon valvuloplasty) can help to further diagnose possible predisposing factors. Although hypotension and electrocardiographic modification following TAVI are often associated with acute coronary ostial obstruction, other procedural stressors may lead to a similar presentation, such as tamponade due to pacemaker, wire, or catheter perforation; hypovolemia due to access site related bleeding; ventricular-aortic junction rupture; aortic dissection; and acute severe mitral or aortic regurgitation.[1] In this case, echocardiography demonstrating evidence of a well filled, globally hypokinetic left ventricle with no signs of pericardial effusion and immediate aortography to exclude an aortic complication was helpful in excluding other diagnoses. Prompt coronary angiography allowing visualization of acute ostial LMCA obstruction was diagnostic. Although surgical rescue can be performed, it is not the optimal solution in these high risk patients. Appropriate skills in interventional cardiology are fundamental to the successful management of this critical situation and to obtaining an immediate favorable outcome.

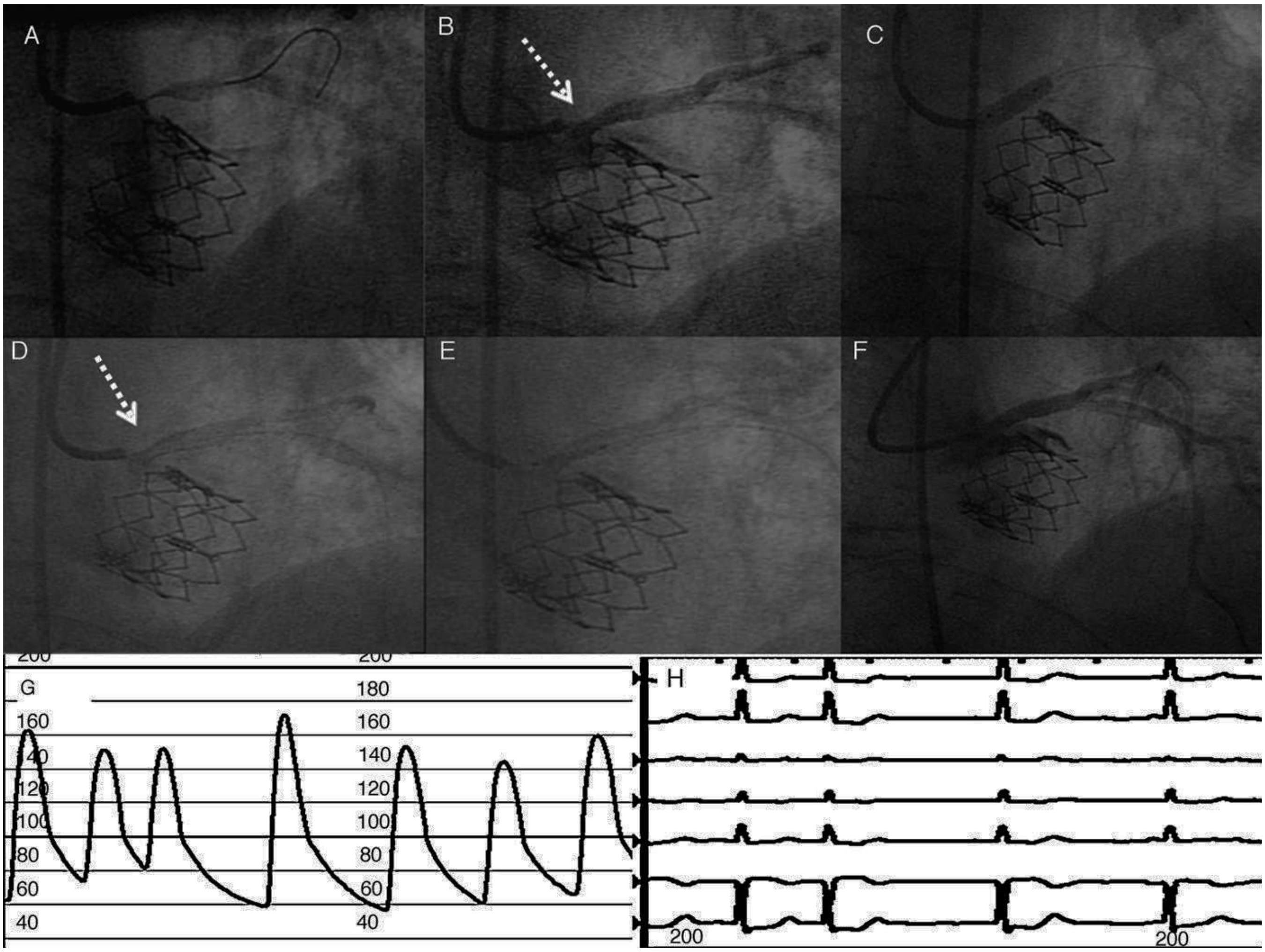

Figure 2. A: Guidewire crossed distally to the narrowing; B: Angiographic view of acute stent recoil; C: Postdilatation showing optimal balloon expansion; D: Fluoroscopic evidence of stent recoil after postdilatation; E: Stent-in-stent positioning; F: Final result; G: Hemodynamic normalization; H: Electrocardiographic normalization.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this section can be found in the online version available at doi:10.1016/j.rec.2011.02.003.

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