

## Global Spotlights

# Coronary interventions 2021: insights from the National Societies of Cardiology Journals of the European Society of Cardiology

Jean-Jacques Monsuez <sup>1\*</sup>, Plamen Gatzov<sup>2</sup>, Ignacio Ferreira-Gonzalez<sup>3</sup>, and Fernando Alfonso <sup>4</sup> on behalf of the Editors' Network of the National Societies of Cardiology Journals European Society of Cardiology<sup>†</sup>

<sup>1</sup>Cardiology, Hôpital René Muret, Hôpitaux Universitaires de Paris Seine Saint-Denis, Avenue du docteur Schaeffner, France; <sup>2</sup>Department of Cardiology, Medical University of Pleven, 1, Kl. Ohridski Street, Pleven, Bulgaria; <sup>3</sup>Cardiology Department, Vall d'Hebron Hospital, and Universitat Autònoma de Barcelona, CIBERESP, Spain; and <sup>4</sup>Servicio de Cardiología, Hospital Universitario de La Princesa, Universidad Autónoma de Madrid, Spain

Several challenging issues with regards to the very large amount of percutaneous coronary interventions (PCIs) performed and the numerous clinical settings they apply have been addressed by studies published in National Societies of Cardiology Journals (NSCJs).

A large Spanish study showed that survival of patients discharged from hospital after primary PCI for ST-elevation myocardial infarction (STEMI) is quite similar to an age-adjusted population life expectancy.<sup>1</sup> However, several differences in success of PCIs and subsequent outcomes have been observed across selected populations. Women included in a Polish nationwide registry have more procedural-related complications after rotational atherectomy and a higher mortality rate.<sup>2</sup> A large multinational survey of patients with acute coronary syndrome (ACS) found similar differences. Women were older than men, with more co-morbidities, and were less often revascularized. Compared with men, a higher percentage of women died during follow-up.<sup>3</sup> Failure and complications of PCI also worsen clinical outcomes of patients, as reported in another large multinational study. Among patients with a non-ST elevation ACS, 5% experienced at least one complication. Procedural complications were associated with early mortality, acute myocardial infarction (AMI), or stroke.<sup>4</sup> More reassuringly, neurological complications following AMI decreased overtime, as reported by the Swedish myocardial infarction registry. Within 10 years the relative risk of ischaemic stroke was reduced by 20% at 1-year post AMI. The reduction coincides with the shift of reperfusion therapy from thrombolysis to primary PCI for STEMI and the increased use of evidence-based secondary preventive therapy according to the ESC guidelines.<sup>5</sup>

Invasive physiological assessment of coronary lesions with fractional flow reserve, which is increasingly used, remains a subject of concern. A

retrospective analysis of PCI performed in two large volume centres in Portugal showed that it was performed in few patients with either stable coronary artery disease (CAD) or ACS only. However, the release of the 2014 ESC guidelines on myocardial revascularization was followed by two-fold increase in its adoption.<sup>6</sup> The usefulness of instantaneous wave-free ratio (iFR) was assessed using the newly developed Syncvision software to guide the iFR-pullback study and the final decision-making process in long, diffuse, or sequential lesions. Similar results with regards to outcomes of patients, including mortality, AMI, stent thrombosis, and target vessel revascularization (TVR), confirmed the safety of this approach too.<sup>7</sup>

Distal radial access for PCI is more difficult than conventional radial access. A Turkish study among patients with ACS found no difference between the success rate of both approaches, but distal access was associated with fewer rates of radial spasm and radial occlusion.<sup>8</sup> According to the 2018 ESC guidelines, PCI for left main (LM) stenosis is increasingly performed after careful staging of lesions using the SYNTAX score. In a study from Bulgaria showing real world results, successful maximal revascularization was obtained after unprotected PCI of LM in all patients with only few unfavourable clinical outcomes during follow up.<sup>9</sup> Percutaneous coronary intervention of LM bifurcation lesions carries a harmful risk of side-branch closure. Two different strategies for provisional side branch interventions have been compared in another study. For non-true bifurcation lesions, a one-stent technique with (aggressive strategy) or without (conservative strategy) mandatory kissing balloon inflation was applied. For true bifurcation lesions, an elective two-stent technique (aggressive strategy) was compared to a one-stent approach followed by a stepwise additional balloon inflation/stenting depending on the residual stenosis of the side branch (conservative

\* Corresponding author. Tel: +33 1 41525832, Fax: +33 1 141525816, Email: [jean-jacques.monsuez@aphp.fr](mailto:jean-jacques.monsuez@aphp.fr)

<sup>†</sup> Listed of the authors provided in the Appendix section.

strategy). Aggressive and conservative strategies for a side branch provisional stenting had similar results with regards to 1-year TVR.<sup>10</sup>

An Egyptian study of patients with STEMI and totally occluded culprit-lesion artery by a heavy thrombus burden compared outcomes of patients in whom thrombus aspiration was performed or not. Thrombus aspiration was associated with better TIMI flow, myocardial blush grade and ST-segment resolution and with reduced 1-month mortality rates.<sup>11</sup>

According to the 2018 ESC guidelines on myocardial revascularization, PCI for chronic total occlusions (CTOs) has increasingly been performed using the recommended calculation of the SYNTAX score. This increased rate was clearly seen in a multicenter study from Belgium and Luxembourg in which procedures achieved technical success in 80% of cases. High-volume centres progressively tackled more complex CTOs while keeping success rates stable overtime.<sup>12</sup> Another issue of concerns pertains to aorto-ostial CTOs since they are often associated with unfavourable anatomic characteristics and unclear vessel course. Procedural success was achieved in 78% PCI of aorto-ostial CTOs among patients included in a large multinational study. There were only few procedural complications. During follow-up, subsequent TVR and cardiovascular mortality rate remained very low.<sup>13</sup>

Treatment of in-stent restenosis is another challenging anatomic scenario. In a 3-year clinical follow-up of patients presenting with bare-metal stent in-stent restenosis, a study from Czech Republic showed more favourable outcomes in patients treated with iopromide paclitaxel-coated balloons as compared with those treated with seal-wing paclitaxel-eluting balloons. Major cardiac adverse events and the need for TVR were seen in two- and three-fold fewer patients, respectively.<sup>14</sup>

A single centre study from Turkey reported the results on concomitant PCI or not in transaortic valve implantation (TAVI). Postprocedural complications including pericardial effusion, stroke, major vascular complications, bleeding, and emergency arrhythmias were similar in patients in whom coronary revascularization was performed simultaneously or performed as a staged procedure before or after TAVI. Although 30-day mortality was higher in simultaneously performed than in staged coronary revascularization, 1-year mortality rates were not statistically different.<sup>15</sup>

Another new field for percutaneous procedures relates to patients with refractory angina in whom revascularization is not suitable. The coronary sinus reducer is intended to relief these disabling symptoms. Among patients in whom the device was implanted in a 5-year Dutch experience, two third of them showed improvements of at least one Canadian Cardiovascular Society (CCS) class and about one half in at least two CCS class.<sup>16</sup>

As metoprolol was recently shown to reduce progression of ischaemic injury in a pig model of STEMI, this effect was assessed in patients with ongoing STEMI. Compared with controls, those who received intravenous (IV) metoprolol before reperfusion had narrower QRS, a lower prevalence of QRS distortion, and a lower sum of ST-elevation, suggesting that IV metoprolol may reduce ischaemic injury. The improvement by metoprolol in the electrocardiogram parameters correlated with improvement in magnetic resonance imaging parameters of infarct size, coronary microvascular obstruction, and left ventricular function.<sup>17</sup>

Publications on PCI released by NSCJs provide real-world insights on the current evolving challenges in management of patients with CAD across countries whose national cardiac societies are affiliated to the ESC. They highlight the advancements taking place in this dynamic field with ongoing procedural improvements and how ESC guidelines are progressively adopted and implemented in a real-world setting.

## Funding

All authors declare no funding for this contribution.

**Conflict of interest:** All authors declare no conflict of interest for this contribution.

## Data availability

We confirm that any required link or identifiers for our data are present in the manuscript.

## Appendix

Jean-Jacques Monsuez (Editor-in-Chief of Archives des Maladies du Cœur et des Vaisseaux Pratique), France; Plamen Gatzov (Editor-in-Chief of Forum for Interventional Cardiology Journal), Bulgaria; Michael Aschermann (Editor-in-Chief of Cor et Vasa), Czech Republic; Hala Mahfouz Badran (Editor-in-Chief of Egyptian Heart Journal), Egypt; Nuno Cardim (Editor-in-Chief Revista Portuguesa de Cardiologia), Portugal; Ariel Cohen (Editor-in-Chief of Archives of Cardiovascular Diseases), France; Jose M De La Torre Hernandez (Editor-in-Chief REC Interventional Cardiology), Spain; Cetin Erol (Editor-in-Chief Anatolian Journal of Cardiology), Turkey; Claes Held (Editor-in-chief Svensk Cardiologi), Sweden; Gerd Heusch (Editor-in-Chief of Basic Research in Cardiology), Germany; Patrizio Lancellotti (Editor-in-chief Acta Cardiol), Belgium; Jan Piek (Editor-in-chief Neth Heart J), Netherland; Juan Sanchis (Editor-in-Chief of Revista Española de Cardiología), Spain; Anetta Undas (Editor-in-Chief Kardiologia Polska), Poland; Dilek Ural (Editor-in-Chief of Archives of The Turkish Society of Cardiology), Turkey; Fernando Alfonso (past- Chairman of the Editors' Network of the European Society of Cardiology), Spain; Ignacio Ferreira-Gonzalez (past-Chairman of the Editors' Network of the European Society of Cardiology), Spain.

## References

- Pascual I, Avanzas P, Almandarez M, Lorca R, Vigil-Escalera M, Arboine L, et al. STEMI, primary percutaneous intervention and recovering of life expectancy: insights from the SurviTEMI study. *Rev Esp Cardiol* 2021;**74**:829–837. <https://doi.org/10.1016/j.recesp.2020.08.006>
- Sabatowski K, Malinowski K, Siudak Z, Reczuch K, Dobrzycki S, Lesiak M, et al. Sex-related differences and rotational atherectomy: analysis of 5177 percutaneous coronary interventions based on a large national registry from 2014 to 2020. *Kardiol Pol* 2021;**79**:1320–1327. <https://doi.org/10.33963/KP.a2021.0131>
- Rossello X, Mas-Llado C, Pocock C, Vicent L, Van de Werf F, Chin CT, et al. Sex differences in mortality after an acute coronary syndrome increase with lower country wealth and a higher income inequality. *Rev Esp Cardiol* 2022;**75**:392–400. <https://doi.org/10.1016/j.recesp.2021.05.009>
- Abtan G, Wiviott SD, Sorbets E, Popovic B, Elbez Y, Mehta SR, et al. Prevalence, clinical determinants and prognostic implications of coronary interventions in non ST-segment myocardial infarction: insights from the contemporary multinational TAO trial. *Arch Cardiovasc Dis* 2021;**114**:187–196. <https://doi.org/10.1016/j.acvd.2020.09.005>
- Svensk HC. *Cardiologi: Informationskrift för Svenska Cardiolögforeningen*. Vol. 3. Swedish Society of Cardiology; 2021:32–34.
- Raposo L, Gonçalves M, Roque D, Gonçalves PA, Magno P, Brito J, et al. Adoption and patterns of use of invasive physiological assessment of coronary artery disease in a large cohort of 40821 real-world procedures over a 12 year period. *Portuguese J Cardiol* 2021;**40**:771–781. <https://doi.org/10.1016/j.repc.2021.01.010>
- Pericet-Rodriguez C, Hidalgo-Lesmes FG, Gonzalez-Manzanares R, Ojeda-Pineda S, Luque-Moreno A, Suárez de Lezo J, et al. Usefulness of physiological coronary assessment with iFR in daily practice and all-comer patients: immediate and follow up results. *REC Interv Cardiol* 2021;**3**:182–189. <https://doi.org/10.24875/RECICE.M21000206>
- Erdem K, Kurtoglu E, Kucuk MA, Ilgenli TF, Kizmaz. Distal transradial versus conventional access in acute coronary syndrome. *Turk Kardiyol Dern Ars* 2021;**49**:257–265. <https://doi.org/10.5543/tkda.2021.64000>
- Gelev V, Zheleva-Kyuchukova I. Percutaneous coronary interventions of unprotected left main stenosis. *Forum Interv Cardiol J* 2021;**1**:25–35. <https://doi.org/10.3897/icf.1.e76246>

10. Kim J, Lee JM, Park TK, Yang JH, Hahn J-Y, Choi J-H, et al. Optimal strategy for side branch treatment in patients with left main coronary bifurcation lesions. *Rev Esp Cardiol* 2021;**74**:691–699. <https://doi.org/10.1016/j.recesp.2020.06.012>
11. Elfekky EM, Penjameen MN, Nassar AI, Elias RR. Outcome of manual thrombus aspiration for patients undergoing primary PCI for acute STEMI showing large thrombus burden. *Egypt Heart J* 2021;**73**:8. <https://doi.org/10.1186/s43044-020-00122-9>
12. Eertsman W, Kayaert P, Bennet J, Ungureanu C, Bataille Y, Saad G, et al. The evolution of the CTO-PI landscape in Belgium and Luxembourg: a four year appraisal. *Acta Cardiol* 2021;**76**:1043–1051. <https://doi.org/10.1080/00015385.2020.1801197>
13. Ojeda S, Luque A, Pan M, Bellini B, Xenogiannis I, Lostalo A, et al. Percutaneous coronary intervention in aorto-ostial coronary chronic total occlusion: outcomes and technical considerations in a multicenter registry. *Rev Esp Cardiol* 2020;**73**:1011–1017. <https://doi.org/10.1016/j.recesp.2020.01.018>
14. Pleva L, Kukla P, Zapletalova J, Hlinomaz O. In stent restenosis treatment with seal-wing paclitaxel drug-eluting balloon catheter. *Cor Vasa* 2021;**63**:442–447. <https://doi.org/10.33678/cor.2021.013>
15. Karaduman BD, Ayhan H, Keles T, Bozkurt E. Impact of coronary revascularization on outcomes of transcatheter aortic valve implantation. *Anatol J Cardiol* 2021;**25**:225–235. <https://doi.org/10.14744/AnatolJCardiol.2020.42728>
16. Silvis MJM, Dekker M, Zivelonghi C, Agostoni P, Stella PR, Doevendans PA, et al. The coronary sinus reducer: 5-year Dutch experience. *Neth Heart J* 2021;**29**:215–223. <https://doi.org/10.1007/s12471-020-01525-8>
17. Diaz-Munoz R, Valle-Caballero MJ, Sanchez-Gonzales J, et al. Intravenous metoprolol during ongoing STEMI ameliorates markers of ischemic injury; a METOCARD-CNIC trial electrocardiographic study. *Basic Res Cardiol* 2021;**116**:45. <https://doi.org/10.1007/s00395-021-00884-6>