Interpretation of cardiac catheterisation reports:

a guide for primary care

INTRODUCTION

Cardiac catheterisation reports often include complex procedural terminology that may be unfamiliar to GPs involved in follow-up of cardiac patients. This article aims to explain the standard nomenclature used in catheterisation reports and provide further insight for GPs into the management of their patients in the cardiac catheter lab.

THE CARDIAC CATHETERISATION REPORT

What do we know about the patient?

This should summarise the patient’s presenting symptoms, comorbidities, and cardiovascular risk factors. In patients who have presented acutely, information should be given on the type of presentation, for example, STEMI/NSTEMI, with additional supporting data such as ECG changes and troponin levels. In patients having planned cardiac catheterisation, details of prior clinical assessment (for example, rapid-access chest pain clinic) and investigations (for example, non-invasive functional testing such as the results of a stress echo) should be included.

What was wrong with the coronary circulation?

The usual arterial access route is via the radial or femoral artery. The diagnostic angiography report comments on each main epicardial artery in turn, starting with the left system. The left main stem (LMS) bifurcates into the left anterior descending artery (LAD) and left circumflex (LCx). Then the right coronary artery (RCA) is described (for common abbreviations see Box 1). On occasions branch vessels will also be described as a subset of their main epicardial vessel. The angiogram report may refer to either the LCx or the RCA as the ‘dominant’ vessel/territory, to indicate which of the two vessels gives rise to the posterior descending artery (PDA) branch. In approximately 70% of subjects the PDA will arise from the RCA. For a diagram of the coronary circulation, see Figure 1.

A number of different techniques may

be used to assess ischaemia (functional assessment). The most commonly used technique is fractional flow reserve (FFR), commonly known as a pressure-wire study. In this investigation, a wire or catheter with a pressure sensor measures the pressure drop across a coronary lesion at maximal hyperaemia, that is, the coronary artery at its maximal size, typically achieved with an infusion of adenosine. If the FFR is ≥ 0.80 , percutaneous coronary intervention (PCI) is not undertaken, because performing angioplasty in this situation would not benefit the patient.^{1,2}

iFR (instant free-wave ratio) is an alternative to FFR that does not require maximal hyperaemia.³

Intra-coronary imaging tools include intravascular ultrasound (IVUS) and optical coherence tomography (OCT). Both offer the cardiologist the ability to directly image the coronary artery lumen. This can give information on the size and length of stent required, and the type of coronary artery lesion and the current state of any previously deployed stents.

What was done to improve coronary flow?

The key aim in PCI is to improve coronary blood flow. In the vast majority of cases, this is achieved by passing a wire through the narrowed segment of the coronary artery (‘the lesion’) and then using that wire to ‘rail-road’ a balloon to the point of the lesion, where it is expanded to widen the vessel (‘pre-dilatation’). A metal stent is then expanded at the same point, therefore acting as a supporting structure to maintain vessel patency. To ensure the stent is both well expanded and well apposed to the vessel wall, further balloon expansion is performed within the stented segment (‘post-dilatation’).

INTERVENTIONAL DEVICES AND TOOLS

Balloons

Compliant/semi-compliant balloons are used to pre-dilate lesions before a stent is deployed, whereas non-compliant (NC)

K O’Gallagher, MRCP (UK), clinical research fellow and specialist registrar in interventional cardiology; **L Dancy**, MRCP (UK), clinical research fellow and cardiology specialist registrar; **L Pearce**, BMBS, cardiology specialist registrar; **J Byrne**, PhD, FRCP, consultant in interventional cardiology, Department of Cardiology, King’s College Hospital NHS Foundation Trust, London. **P Milton**, MRCP, MRCGP, GP clinical lead, Randolph Surgery, Maida Vale, London.

Address for correspondence

Department of Cardiology, King’s College Hospital NHS Foundation Trust, London, UK.

E-mail: k.o’gallagher@nhs.net

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Box 1. Summary of commonly used abbreviations.

BMS = bare metal stent. CTO = chronic total occlusion. DAPT = dual-antiplatelet therapy. DEB = drug-eluting balloon. DES = drug-eluting stent. FFR = fractional flow reserve. IABP = intra-aortic balloon pump. IVUS = intravascular ultrasound. NSTEMI = non-ST-elevation myocardial infarction. OCT = optical coherence tomography. STEMI = ST-elevation myocardial infarction.

Figure 1. The coronary circulation.

Panel A shows a 'right-dominant' coronary circulation, in which the PDA arises from the RCA. Panel B shows a 'left-dominant' coronary circulation, in which the PDA arises from the LCx.

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balloons are used to post-dilate stents after deployment to ensure that the stent is well apposed to the vessel wall.

Cutting balloons are designed to be used in heavily calcified lesions that do not expand with standard balloon dilation.

Drug-eluting balloons (DEB), which are often used to treat in-stent restenosis and/or side-branch lesions, have a drug coating, which adheres to the vessel wall upon balloon expansion.

Stents and scaffolds

Metal stent devices can be either bare-metal stents (BMS) or drug-eluting stents (DES). BMS require a shorter duration of dual-antiplatelet therapy (DAPT), but newer-generation DES allow a shorter period of DAPT to be safely used. Modern DES 'elute' either zotarolimus or everolimus (both sirolimus analogues, which are immunosuppressants). The principle is to inhibit neointimal hyperplasia and reduce the incidence of restenosis. The choice of which particular DES is used is based on a number of factors (for example, the drug eluted, the deliverability of the stent, the exact size needed or the minimum duration of DAPT required). Modern DES are associated with low rates of in-stent restenosis and thrombosis.

Bioresorbable scaffolds (BVS or BRS) perform the same role as a stent in that they provide a scaffold to ensure vessel patency. They are completely resorbed over a period of time (usually 18 months to 2 years).

Polymer-free drug-coated stents are similar to DES, but lack the polymer layer that binds and elutes the relevant drug in DES. Drug-coated stents tend to be used in patients with a high bleeding risk due to the shorter mandatory duration of DAPT.⁴

Acute coronary syndromes

In acute coronary syndromes (ACS) and in particular STEMI, patients will often require adjunctive antiplatelet drugs in addition to the standard weight-adjusted heparin and DAPT. Examples of these are the GpIIb/IIIa inhibitors abciximab (ReoPro) and tirofiban (Aggrastat).

In STEMI, there is often a high-thrombus burden in the coronary artery. This can be removed using an aspiration catheter, which has a vacuum syringe at the end to facilitate clot extraction. In certain situations, such as cardiogenic shock, left ventricular support devices, such as the intra-aortic balloon pump (IABP) (which supports perfusion by increasing diastolic pressure, during which the coronary arteries are perfused) or Impella

(which increases cardiac output by means of a pump placed in the LV) are required to provide short-term haemodynamic support.

Complex percutaneous coronary interventions

Coronary interventions may be regarded as complex due to a spectrum of technical considerations including lesions that are multi-vessel, technically complicated (for example, with heavy calcification), requiring advanced PCI equipment, or a combination of all three.

Chronic total occlusion (CTO) disobliteration. This refers to the re-opening of chronically occluded vessels (as opposed to the revascularisation of acute vessel occlusion in the ACS setting). CTO disobliteration often involves the use of large-bore catheters, specialised coronary wires, and micro-catheters to aid progression of the wire along the course of the artery, either through the lumen or the vessel architecture.

Rotablation. This is a technique used for heavily calcified lesions that would not otherwise adequately expand with balloon dilatation alone, or for lesions that are so narrow they will not allow a coronary balloon to pass. It utilises a diamond-tipped burr, which rotates at 150 000 revolutions per minute, modifying the calcium and allowing appropriate deployment of stents.

FOLLOW-UP

Every cardiac catheterisation report should contain a detailed follow-up plan, stating clearly the recommended medical therapy (including the plan for antiplatelet therapy if required). Although the standard antiplatelet plan is 12 months of DAPT followed by aspirin lifelong, management plans are often individualised with either shorter or longer regimens, depending on the patient's clinical situation.

In the setting of ACS, information should also be included on the management of any bystander disease, for example, if the patient not only had a STEMI due to an occluded LAD that was opened at the time of the heart attack, but also had significant disease in one or more other coronary arteries. What is the plan of management for the remaining coronary lesions?

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