Interventional Cardiology

Guidance on interventional diagnosis and treatment of coronary artery disease in 2014

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RIPCORD trial: routine pressure wire assessment during diagnostic angiography

Evaluation of: Curzen N, Rana O, Nicholas Z *et al.* Does routine pressure wire assessment influence management strategy at coronary angiography for diagnosis of chest pain? The RIPCORD study. *Circ. Cardiovasc. Interv.* 7(2), 248–55 (2014).

Assessment of patients with a clinical history of possible angina but without objective evidence of ischemia is commonly undertaken with diagnostic angiography. Based on visual assessment of the severity of coronary artery disease, a management plan which may involve percutaneous coronary intervention (PCI) or coronary artery bypass grafts (CABG) is formulated but this assessment may be flawed. Pressure wire assessment following coronary angiography is a well-validated method for assessment of the functional severity of coronary artery disease [1] and be a more accurate gate keeper for revascularization.

A total of 200 patients listed for coronary angiography to investigate the cause of chest pains were included in the study [2]. Exclusion criteria included acute coronary syndrome at presentation, CABG and angiography within the previous 12 months. Patients underwent diagnostic angiography after which the supervising consultant was asked to formulate a management plan. Patients without significant stenosis were excluded from the study at this point. Subsequently a second interventional cardiologist performed a fractional flow reserve (FFR) study according to a standardized protocol. A reading <0.8 indicated a lesion had hemodynamic significance and merited treatment. These data were to formulate a new management plan. The primary end point was the proportion of patients in whom FFR data changed the original management plan.

Overall, the FFR data changed the management plan in 26% of patients in the study. FFR also reclassified the functional significance of 32% of the lesions assessed and in particular 18% of revascularization decisions to the left anterior descending artery, thought to be of most prognostic significance, were incorrect with angiography alone. Interestingly, of the 90 patients originally recommend for PCI, 24 (26.7%) were changed to medical therapy following FFR.

The study demonstrates the shortcomings of clinical decision making based on assessing the angiogram alone, although switching to an FFR assessment strategy may have logistical, cost and safety implications. These limitations and how proper lesion adjudication may affect clinical outcomes need to be addressed.

XIMA trial: drug-eluting stents versus bare metal stents for angina in the elderly

Evaluation of: de Belder A, de la Torre Hernandez JM, Lopez-Palop R *et al.* A prospective randomized trial of everolimus-eluting stents versus bare-metal stents in octogenarians: the XIMA Trial (Xience or Vision Stents for the Management of Angina in the Elderly). *J. Am. Coll. Cardiol.* 63(14), 1371–1375 (2014).

The use of drug-eluting stents (DES) in elderly patients is controversial, with the benefit of reduced rates of restenosis difficult to weigh up against the potential for increased

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bleeding on dual antiplatelet therapy and poor adherence to this regimen. Trial protocols often exclude this elderly group leading to limited outcome data based on retrospective analyses.

A total of 800 patients aged over 80 years with coronary disease warranting DES were randomized in a 1:1 fashion to everolimus-eluting Xience stents or Vision Bare Metal Stents (Abbott Vascular, CA, USA) [3]. Patients with ST-elevation myocardial infarction (MI) and cardiogenic shock were excluded from the study. Patients with poor life expectancy, thrombocytopenia, recent gastrointestinal hemorrhage or intracerebral hemorrhage were also excluded.

Demographic and procedural characteristics were well matched between the two groups. The primary end point of death/MI/target vessel revascularization (TVR)/cerebrovascular vascular accident/severe hemorrhage was reduced in the DES group although this did not reach statistical significance (14.3 vs 18.7%; p = 0.09). The overall mortality between the groups was not statistically different but DES did significantly reduce the risk of MI (4.3 vs 8.7%; p = 0.014) and TVR (2.0 vs 7.0, p = 0.0009).

This study demonstrates that although the choice of stent can be difficult in the elderly, treatment with DES is safe and reduces coronary event rates over the subsequent 12 months. Decisions should be tailored to individual patient needs.

HEAT PPCI trial: bivalirudin versus heparin in primary percutaneous coronary intervention

Evaluation of: Shahzad A, Kemp I, Mars C *et al.* Unfractionated heparin versus bivalirudin in primary percutaneous coronary intervention (HEAT-PPCI): an open-label, single centre, randomised controlled trial. *Lancet* pii: S0140-6736(14)60924-7 (2014).

Bivalarudin is an established treatment during primary percutaneous coronary intervention (PPCI) following trials such as HORIZONS-AMI [4] that have suggested that use of bivalirudin improves mortality at 30 days, predominantly by reducing bleeding events. However, the comparator has been heparin with glycoprotein IIB/IIIA inhibitor (GPI; 98% use in HORIZONS-AMI) and this may have stacked the cards in favor of bivalirudin. Perhaps this does not reflect real-world practice, where GPI is used more sparingly.

The single-center HEAT PPCI study assessed 1829 patients presenting with ST-elevation myocardial infarction randomized to bivalirudin or unfractionated heparin with bail-out GPI given in both arms (approximately 15% in both) during PPCI [5]. The primary outcome measure was major adverse cardiac events (MACE) at 28 days with the primary safety outcome measure as major bleeding.

Demographic and procedural characteristics were well matched. The primary outcome measure was reduced with heparin (5.7 vs 8.7%; p = 0.01) as was mortality. The main driver of the MACE difference was a markedly higher rate of stent thrombosis in the bivalirudin group (0.9 vs 3.4%; p = 0.001); there was no significant difference in bleeding rates between groups.

Heparin appeared to be superior to bivalirudin in preventing MACE after PPCI when largely used without GPI and there was no trade off with reduced bleeding in the bivalirudin group. These findings conflict with the results of several other studies such as HORIZONS-AMI, ACUITY [6], EUROMAX [7] and registries. Concern has been expressed in the trial design (delayed consent) and possible underdosing/ abbreviated dosing of bivalirudin. It is possible that bivalirudin with heparin (co-administered in ~60% of HORIZONS-AMI patients in the bivalirudin arm) is optimal to GPI and heparin and further studies are required to resolve these trial differences.

EUROVISION Registry: Bivalirudin use in European practice

Evaluation of: Hamon M, Nienaber C, Galli S *et al.* Bivalirudin in percutaneous coronary intervention: The EUROpean BiValIrudin UtiliSatION in Practice (EUROVISION) Registry. *Int. J. Cardiol.* 173(2), 290–294 (2014).

Bivalirudin is a direct thrombin inhibitor which is approved for use in percutaneous coronary intervention (PCI). The EUROVISION registry assessed short-term clinical outcomes in PCI patients treated in centers in Austria, France, Germany, Italy and the UK [8].

Data were collected for 2018 consecutive patients treated with bivalirudin in 58 centers and included in-hospital and 30-day efficacy outcomes (death, myocardial infarction, stroke and unplanned revascularization) and safety outcomes (stent thrombosis and major bleeding). Approximately a quarter of patients had PCI for stable angina and a third of patients had PCI for ST-elevation myocardial infarction with a third having radial access and a third bare-metal stenting.

The registry demonstrated a low overall 30-day mortality of 1.0% with a composite of death/myocardial infarction/stroke/urgent revascularization of only 2.9% at 30 days. The major bleeding rate was 1.6% but this was threefold higher in those with renal impairment. Reassuringly they did not observe a high rate of stent thrombosis at 30 days (only two out of 2018 patients).

The results are consistent with the HORIZONS-AMI data [4]. Bivalirudin appears to be safe for all-comers PCI albeit with the inherent limitations of a registry study. These findings may allay some of the fears surrounding data emerging from HEAT-PPCI,

which concluded that bivalirudin was inferior to heparin, largely driven by a higher acute stent thrombosis rate in the bivalirudin arm.

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