consideration for whether rewiring or a support wire is needed. Thrombectomy should be attempted before any other instrumentation. A smaller catheter with stylet (eg, Pronto LP) is often easier and can also be used to administer adenosine or intracoronary GP IIb/IIIa antagonists if there is slow/no reflow. Intravascular ultrasound (IVUS) is strongly recommended at this point to assess the intraluminal anatomy. Optical coherence tomography imaging is more sensitive than IVUS and can provide even more information, such as the extent of new intimal coverage. Reintervention depends on the cause of the stent thrombosis. In the case of stent strut malapposition, an appropriate intervention is IVUS-guided noncompliant balloon to high-pressure angioplasty, whereas if there is no mechanical problem or malapposition and the problem is inappropriate DAPT cessation, it may be sufficient to do plain balloon angioplasty with high-pressure semicompliant balloon to ensure that the stent is wide open. It may not be necessary to do more than pharmacological thrombectomy. Restenting should be avoided when possible, as it has been associated with worse outcomes [Burzotta F et al. *Eur Heart J* 2008]. Slow flow is an independent predictor of poor outcome, and use of glycoprotein IIa/IIIb to improve flow should be considered. Finally, post-reintervention management is dependent on the cause of the thrombosis; however, other factors that should be considered include platelet function testing (eg, VerifyNow) and the use of newer ADP receptor blockers (eg, prasugrel/ticagrelor) for 1 year as well as patient education, particularly if compliance is an issue.

In the management of stent thrombosis, early and accurate diagnosis is critical and should be followed by appropriate pharmacology and intervention. IVUS is vital for a good reintervention. Restenting should be avoided if possible, and careful thought should be given to appropriate antiplatelet therapy and patient education.

Borderline (Intermediate) Coronary Plaques

Written by Phil Vinall

Angiographic assessment of coronary lesions with intermediate severity (ie, luminal narrowing with a diameter stenosis >40% but <70%) continues to be a challenge. Magdy Rashwan, MD, University of Alexandria, Alexandria, Egypt, discussed some of the techniques that can be used to assess these lesions and how their composition affects prognosis.

Fractional flow reserve (FFR) is a useful technique for measuring the functional severity of narrowing in the coronary arteries, as it can measure the pressure gradient and flow across different regions. FFR is the standard in many catheterization labs; however, it is an invasive technique. Several studies have assessed the correlation between noninvasive approaches and FFR results to determine the quality of the correlation.

Lockie and colleagues recently reported that high-resolution 3.0 T cardiac magnetic resonance (CMR) perfusion can detect hemodynamically significant coronary stenosis, as determined by FFR [*J Am Coll Cardiol* 2011]. In contrast, a poor correlation between stenosis severity, as determined by computed tomography coronary angiography (CTA) or conventional coronary angiography, and ischemia that is measured by FFR was previously shown [Meijboom WB et al. *J Am Coll Cardiol* 2008]. These results were recently confirmed by Voros and colleagues, who showed better functional correlation with intravascular ultrasound (IVUS) than with CTA [*J Am Coll Cardiol Intv* 2011]. Prof. Rashwan said that in the catheterization lab, the ideal assessment for intermediate lesions is by FFR or IVUS; however, for a noninvasive approach, myocardial perfusion by MRI is the most promising technique.

The PROSPECT trial was a large, prospective, natural history study in 700 patients with acute coronary syndromes (ACS). Subjects were enrolled after undergoing successful and uncomplicated percutaneous coronary intervention for the treatment of all coronary lesions that were believed to be responsible for the index event and after the completion of any other planned interventions. The primary purpose of the study was to confirm the hypothesis that ACS arises from atheromas with certain histopathological characteristics and that these characteristics are not necessarily dependent on the degree of angiographic stenosis at the site. Grayscale and radiofrequency intravascular ultrasonographic imaging was used prospectively to characterize coronary atherosclerosis before longitudinal follow-up. Although the major adverse coronary events (MACE) that occurred during the 3 years of follow-up were equally attributable to recurrence at the site of culprit lesions and to nonculprit lesions, the nonculprit lesions were frequently angiographically mild, and most were thin-cap fibroatheromas or were characterized by a large plaque burden, a small luminal area, or some combination of these characteristics [Stone GW et al. *New Engl J Med* 2011]. Prof. Rashwan also presented data from a very recent (unpublished) study from Vazquez and colleagues, showing the correlation between plaque composition of intermediate lesions and the incidence of MACE. In that study, higher calcium density corresponded with fewer MACE, while a larger plaque burden, fibrofatty area, and fibrofatty percent corresponded with higher rates of MACE.

Plaque stability deserves an important consideration and is related to its histological composition. In a recent study,

Kubo and colleagues [Kubo T et al. *J Am Col Cardiol* 2010] used virtual histology (VH) IVUS to investigate the natural history of coronary artery lesion morphology. Lesions were classified into pathological intimal thickening (PIT), 6 thin-capped fibroatheroma (TCFA), thick-capped fibroatheroma (ThCFA), fibrotic plaque, and fibrocalcific plaque. Over the 12 months of follow-up, most VH-TCFAs healed; however, new VH-TCFAs also developed. PITs, VH-TCFAs, and ThCFAs showed significant plaque progression compared with fibrous and fibrocalcific plaque, indicating that this is a dynamic disease.

Transfemoral and Percutaneous TAVI: Prediction and Management of Vascular Complications

Written by Maria Vinall

Patients with severe aortic stenosis and high surgical risk can be treated less invasively with transcatheter aortic valve implantation (TAVI). Different access routes have been proposed for TAVI, including transapical, transsubclavian, and transfemoral, with percutaneous transfemoral being preferred because it is the least invasive and nonsurgical. Bernard Chevalier, MD, Institut Cardiovasculaire Paris Sud, Massy/Quincy, France, presented data from the Massy TAVI database regarding the institute's early and later experience with performing 170 transfemoral TAVIs (140 patients with full percutaneous approach).

Patients in the early and later experience groups had similar demographics, patients in the later group were at higher risk, based on Euro scores (26.9 ± 11.8 vs 21.1 ± 10.7 in the late group; p=0.003) and left ventricular ejection fraction (LVEF; 45.8 ± 13.1 vs 54.3 ± 14.2 in the late group; p<0.001). Access vessel diameter was measured angiographically or with multislice computed tomography (MSCT). Patients were required to have calcification and tortuosity scores between 0 and 3. Vascular complications (20 patients vs 8 in the late group; p=0.012) occurred significantly more often among patients in the early group, most likely due to a learning curve with the Prostar device. This translated into longer intensive care unit stays (7.5 vs 3.3 days; p=0.039) in the earlier cohort, despite their lower risk profile.

The optimum sheath:femoral artery ratio (SFAR) was 1.05 mm. Ratios that were higher than this were associated with significantly (p<0.05) more frequent femoral artery, iliac artery, and Valve Academic Research Council (VARC) major and minor vascular complications, as well as mortality (both in-hospital and 30-day). Factors that were predictive of major VARC complications were body mass index, early experience, SFAR, and femoral artery minimum luminal diameter.

Prof. Chevalier presented his top tips to reduce vascular access complications during TAVI:

- Do not use an 18F sheath if common femoral arter (CFA) <6.8 mm
- Stick the middle of the anterior wall of the CFA
- Use fluoroscopy to check the deployment of the 4 needles
- Introduce large sheath only on extra stiff wire
- Progress with a back-and-forth rotation
- Eliminate large iliac dissections before removing the sheath
- Make the surgical knots with wet sutures at the end of the TAVI
- Keep the wire in place when pushing the first knot
- Check angiographically from the opposite side after closure

In order to deal with potential complications, it is important to be comfortable with specific techniques, including a crossover, balloon angioplasty, femoral stenting, and covered stenting. In concluding, Prof. Chevalier stressed the following:

- A full percutaneous approach allows a less invasive solution, but the operator will need to overcome a learning curve
- Avoid transfemoral TAVI if the CFA <6.8 mm, even with Corevalve (SFAR >1.05)
- A team approach is necessary (particularly if experience is limited)
- Optimal patient screening, approach selection, and device refinement may improve outcomes

Revascularization in the Diabetic Patient

Written by Maria Vinall

Diabetes is an independent predictor of many serious adverse events, including major adverse cardiac events (MACE). Spencer King, MD, St. Joseph's Heart and Vascular Institute and Emory University, Atlanta, Georgia, USA, reviewed several studies that evaluated revascularization in diabetic patients who have stable coronary artery disease (CAD). Dr. King discussed the issues that surround