AN INTERVIEW WITH...

Neil Moat, FRCS

Neil Moat discusses his work in valvular heart disease research, including expanding the TAVR population, valve-in-valve procedures, and transcatheter mitral valve interventions.

Currently, what is the main focus of your research efforts?

There are three main strands to this. The first is the ongoing evaluation of real-world transcatheter aortic valve replacement (TAVR) outcomes by way of the United Kingdom Transcatheter Aortic Valve Implantation (UK TAVI) registry. This registry has captured data on every consecutive TAVR implantation in the United Kingdom since the first procedure in 2007 and has robust long-term mortality tracking. The second is the UK TAVI trial, for which I am the surgical lead investigator. This trial is close to completing its recruitment. It is the only trial that generically compares the strategy of surgical AVR versus TAVR (ie, it is not device specific), is independent of industry funding, and preliminary reports would suggest that the risk profile of patients in this trial are lower risk than those reported on in currently published trials. The third strand is in the field of novel catheter-based mitral valve interventions, including novel devices for mitral valve-in-ring procedures, transventricular expanded polytetrafluoroethylene chordal implantation with the TSD-5 mitral valve repair device (Harpoon Medical, Inc.), and transcatheter mitral valve repair (TMVR) with the Tendyne mitral valve system (Abbott Vascular).

What is currently the biggest issue that still needs to be tackled to further expand TAVR to more (or all) patients, even with the latest generation of technology in use? What is the next data milestone to be reached?

Substantial progress has been made in reducing some of the early complications associated with TAVR such as vascular injury, paravalvular leak, and high rates of pacemaker implantation. There is convincing evidence that the vast majority of patients undergoing TAVR experience microscopic cerebral emboli, resulting in widespread brain lesions, which are detectable by MRI and persist in the midterm. There is increasing evidence that the first-generation cerebral embolic protection devices can reduce this embolic burden and probably affect neurological outcomes. We will have to dramatically improve in this field to expand TAVR to younger and lower-risk patients.

The next data milestone to be reached is undoubtedly valve durability. There is currently only a very small number of patients surviving beyond 8 years following TAVR. Experience from the surgical literature clearly demonstrates that a number of promising bioprosthetic valve designs failed rather dramatically after 8 to 10 years. With the initial elderly and high-risk cohorts of patients initially treated with TAVR, it will be some time before we have this information. It is very encouraging to see that new randomized, low-risk trials are being funded for very long-term follow-up after TAVR and surgical AVR. Another important factor will be whether different TAVR devices vary in terms of durability and what the failure modes will be when these devices eventually degenerate (ie, will degeneration be gradual and predictable, or will it be sudden and catastrophic?).

As we enter the last 12 months in the primary phase of the early feasibility study of the Tendyne mitral valve system, can you tell us about your experience with the device to date and what you think the preliminary results might show?

We have considerable experience with the use of the Tendyne mitral valve system for TMVR, both in terms of the first in-man experience under a compassionate use protocol and now in the global early feasibility study. Our personal experience is that (albeit with very careful and detailed preprocedural planning) the implantation of this device is relatively straightforward, reproducible, and has few periprocedural issues. The apical pad also seems to facilitate closure or reduce any problems with apical puncture with a large-bore device. To date, this system has the largest number of clinical implantations, and based on what has been reported at recent meetings, a somewhat lower 30-day mortality than other devices in this space. It is unknown how much this is due

to patient selection, the ease of implantation, or possibly, beneficial effects on left ventricular function from the tether linking the apex of the left ventricle to the mitral annulus (ie, to the base of the ventricle), which is certainly producing some very interesting early changes in ventricular physiology. The newer, lower-profile, Tendyne device also facilitates expanding the patient pool of those who can to be treated with this system.

What does your decision-making process entail when choosing an access approach for TAVR? What patient and anatomic factors go into this decision, what preprocedural examinations are involved, and what guidelines do you consult?

There is a wide range of potential access routes for TAVR. The progressive reduction in the external diameter of sheaths and delivery systems for all devices has meant that the proportion of patients who are able to be treated using a transfemoral approach has increased dramatically over the last few years. I think there is clear evidence that in the elderly and high-risk patient population, the need to go to a transthoracic (transapical or direct aortic) approach increases the early risk over and above what is predicted by the increased risk profile of these patients. We should remember though that there is strong supportive evidence (allied to clinical experience) that demonstrates that the more proximal access routes can result in more accurate positioning of the device and therefore may come back into fashion as we move into younger and lower-risk patients who may be able to tolerate transthoracic approaches. Also, the left subclavian and left common carotid access routes should not be ignored.

The selection of access route is, in our practice, determined by detailed multislice CT examination of the entire aortoiliofemoral arterial systems at each level, not only looking at size, but also at tortuosity and circumferential calcification.

How do you determine placement/device height for aortic valve-in-valve implantation?

When we talk about aortic valve-in-valve implantation, we must distinguish between implants for failing stented versus stentless valves, as these are completely different procedures. For stented bioprostheses, we use CT for access planning but use the manufacturer's recommendations and the Aortic Valve in Valve app (UBQO, Ltd.) to predict what size TAVR device is required. Procedural imaging depends upon the nature of the original stented device. Where there are good fluoroscopic markers, it really can be very straightforward to place the device in an optimal position with fluoroscopic guidance. Where there are scanty or no fluoroscopic markers, then we would always use adjunctive transesophageal echocardiography to help guide the implantation.

With regard to stentless valves, we use the same imaging protocol but rely much more heavily on CT in combination with preprocedural transesophageal echocardiograpy to assess the size of device needed. We would always use general anesthesia for a valve-in-valve procedure for a stentless bioprostheses.

The optimal depth of implantation and device positioning dramatically vary according to the nature of the original surgical implant and thus cannot be standardized—again, much more so in stentless than stented bioprostheses.

What have you learned from working with colleagues throughout Europe to spread the practice of percutaneous valve repair/replacement?

I think the whole field of catheter-based intervention for valvular heart disease has brought together surgeons and cardiologists, imaging specialists, and many other groups into this exciting field of structural heart intervention. At our institution, we passionately believe in this process, both in terms of the multidisciplinary preprocedural assessment but also in terms of the implantation team for every procedure, which consists of a cardiac surgeon and interventional cardiologist, with both of those individuals able to contribute actively to the procedure with complementary skill sets.

Can you give us a brief overview of the "resect versus respect" philosophy and how it might offer benefits in mitral valve treatment?

The respect (ie, preservation of as much leaflet tissue as possible) compared to the resect (classic Carpentier) teaching with, generally speaking, quadrangular resectioning of the P2 of the posterior leaflet offers a number of theoretical if not real advantages. There is no doubt that the resect philosophy produces a rather monocuspid valve with a relatively fixed posterior leaflet. Long-term outcomes of the resect procedure undoubtedly result in a number of patients who develop short, fibrosed,

and retracted posterior leaflets, which result in late recurrent mitral regurgitation. The aim of the resect philosophy is to try to create a mitral valve that is as close as possible to the normal physiological state. However, in the field of mitral valve repair in particular, the approach and procedure must be tailored to the very wide range of pathophysiological states and annular and leaflet sizes found in the mitral condition.

What do you think the biggest takeaway is from the Valve-in-Valve International Data (VIVID) registry?

There are a number of important messages from the VIVID registry. First, this is a practical and reproducible procedure with good outcomes. The second is that procedures dealing with degenerated stentless valves are technically more challenging and carry a higher risk than those with stented bioprostheses (for a variety of reasons). There is a strong argument that valve-in-valve TAVR for failing stentless valves should be performed in specialist centers. The final, and perhaps the most important message, relates to valve-in-valve TAVR in patients who have a previously implanted stented bioprosthesis with a small internal diameter (< 21 mm). We must remember that this does not equate to the manufacturers label size of the valve! The results in these patients are significantly worse, both in terms of high residual gradients, patient-prosthesis mismatch, and increased 30-day and 1-year mortality compared to valve-in-valve TAVR with larger stented devices. The crucial message is that these stented devices with small internal diameters should not be implanted by surgeons, or the patient will not be left with a good option for a valve-in-valve TAVR at a later date. ■

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Disclosures: None.