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MAGAZINE

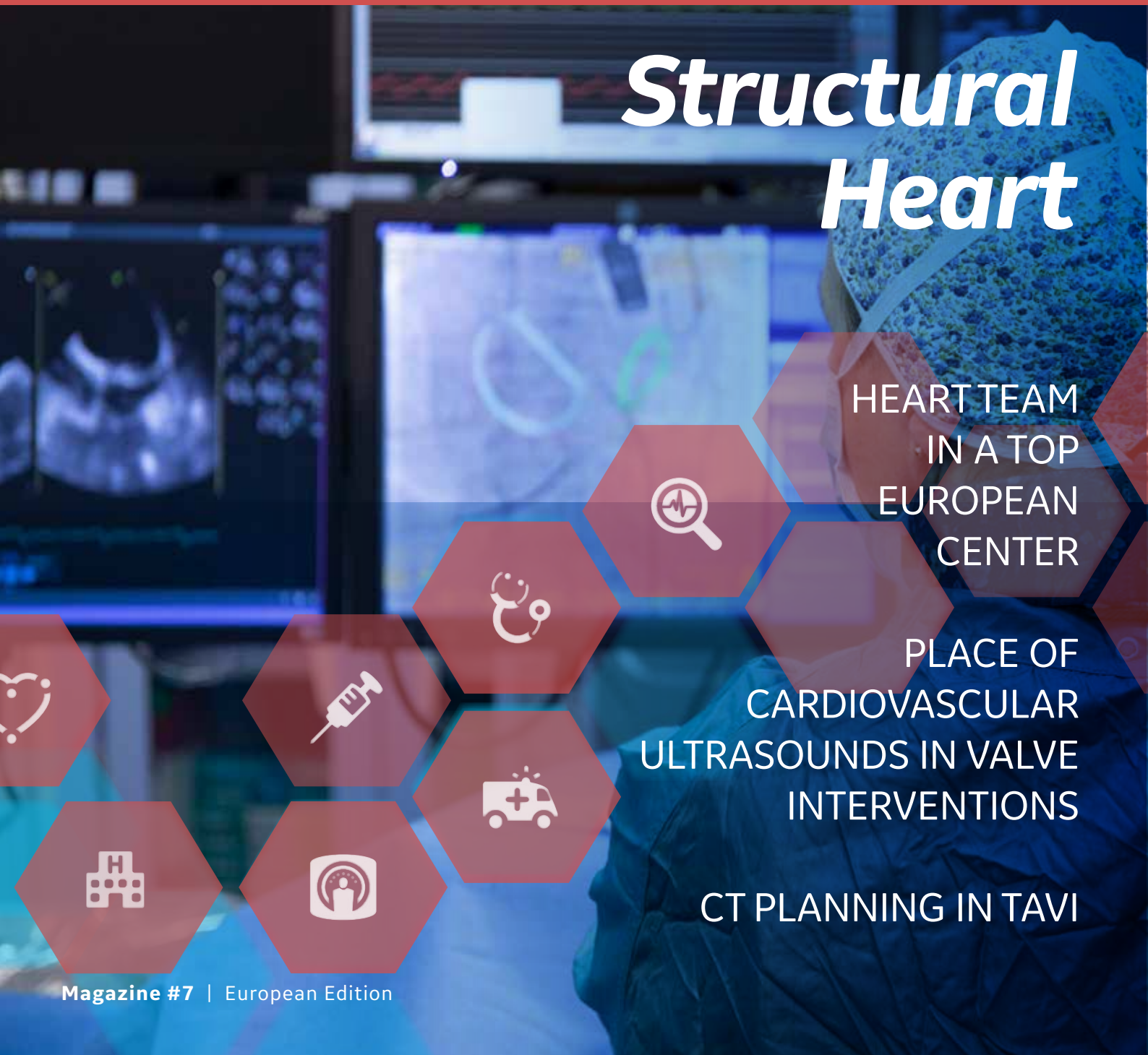
Innovative Interventional Treatments

Structural Heart

HEART TEAM
IN A TOP
EUROPEAN
CENTER

PLACE OF
CARDIOVASCULAR
ULTRASOUNDS IN VALVE
INTERVENTIONS

CT PLANNING IN TAVI





Heart Care

Dedicated to Interventional Cardiology



A comprehensive set of solutions for the cardiac care pathway. From diagnostic to PCI to structural heart interventions, GE's portfolio provides a comprehensive set of solutions to the Heart Teams, enabling them to make the appropriate decisions for the optimal patient care pathway, in an accurate and timely manner, at very low dose.



Jean-François Drouet
Image Guided Therapy
Director Europe



Erika Saillant
Interventional Cardiology
Marketing Manager Europe

Dear Heart Teams,

Involved in structural heart treatments, you are improving fragile patient lives, constantly pushing the boundaries to improve their outcomes.

This edition aims to pay homage to the teams that give their very best every day.

Our role is to provide you with innovative technologies in all imaging modalities, CT scanner, image-guided systems and cardiovascular ultrasound, which ASSIST you to push the boundaries of these percutaneous structural heart treatments.

We warmly thank our customers who share their Heart team experience, their perspective on imaging, and examples of how advanced tools are used by them.

We wish you an excellent read.

Jean-François Drouet and Erika Saillant

“*The strength of the team is each individual member. The strength of each member is the team.**”



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Printer: Handiprint

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Heart team in action in a top European center

St Thomas' Hospital, London

A LONG-STANDING TRADITION OF TEACHING AND INNOVATION

At the heart of London, where the capital's energy can be felt, stands St Thomas's Hospital, facing the Houses of Parliament, with a long tradition of teaching and initiating innovation. The cardiac department at St Thomas' Hospital treats the full spectrum of cardiac conditions including acute coronary syndromes, heart failure, arrhythmias and heart valve disease. It is internationally recognized for its transcatheter heart valve programme and performs more than 300 TAVIs per annum along with additional advanced mitral and tricuspid therapies. Guy's and St Thomas' NHS Foundation Trust were early adopters of innovations in valve interventions. They continue to be at the forefront and remain active with research and in the evaluation of new devices while developing new imaging and technical solutions to otherwise complex clinical problems.

Pioneering in valve interventions



Pr. Bernard Prendergast

“For more difficult challenging valve interventions, imaging is continuously helping to open our eyes, and we can perform these procedures more safely.”

Heart Team Foundation



Pr. Simon Redwood

Legacy

There is a long standing tradition of innovation at Guy's and St Thomas'. For example, some of the first congenital heart disease interventions, coronary bypass grafting surgery and valve operations in Europe were performed at Guy's Hospital.

A small group of early adopter centres have been pioneering TAVI in the UK. In early 2008, St Thomas' Hospital was naturally one of the first to adopt the TAVI procedure and evolved the programme rapidly, thanks to the forward thinking of Pr. Simon Redwood and Martyn Thomas who were working at St Thomas' at the time.

The first transcatheter mitral valve replacement procedure in the world was performed here at St Thomas' in 2013 with the FORTIS¹ valve (Edwards). *“We have always taken a very open minded attitude to innovation. Because of our excellence*

in clinical research and high level of procedural and imaging excellence, we are an attractive site for industry to partner with.”

The St Thomas' team is also very active in the mitral and tricuspid spaces, having access to innovative mitral valve devices. The team was involved in some of the first implants with the valve from Medtronic, and is

still active in more complex innovative TAVI procedures, electrosurgical techniques, transcaval and BASILICA procedures (Bioprosthetic Aortic Scallop Intentional Laceration to prevent Iatrogenic Coronary Artery). As a result of experience accrued at St Thomas' Hospital, they often accept complex cases from other centres that require specific technical or advanced imaging input. [□](#)



Pr. Bernard Prendergast and Pr. Simon Redwood are well recognized in the broad interventional community, and specifically in structural heart treatments. An extraordinary mechanism lies behind the scenes enabling them to treat patients safely and efficiently. This is underpinned by an exceptional heart team who give their best every day knowing that the work they do influences the day to day lives of their patients.

“The patient always comes first. This is a very important thing to remember, and the team here at St Thomas' recognizes that. We have very forward thinking surgical colleagues, who were part of the programme from day one. The programme grew in in partnership and not in competition. In the early days, TAVI was very different from what we see now. Procedures were

performed under general anaesthesia and 50% were performed using transapical access. Our evolution has been achieved by close collaboration with our surgical colleagues and this has translated into rapid changes to our programme, improvements in patient outcomes and low complication rates.” says Pr. Prendergast.

The team recognizes the fact that intensive care is crucial, as is the support of experts in pre-, peri- and post-operative care. While surgeons are no longer required during the TAVI procedure, they are included in all discussions to find the right treatment for the patient.

“The surgeons are very much part of the team. We always discuss very openly what is the treatment for each

individual patient.” comments Pr. Prendergast.

The team here definitely played a role in creating the heart team concept, and PCR London Valves was branded in the very early days as the “Heart Team” meeting. [□](#)

TAVI: The patient pathway at St Thomas'

TAVI indication: One-stop shop for the patient



Rebecca Reid and Gemma Beilby, nurses specialized in structural heart disease, intervene as soon as the patient is referred to St Thomas' hospital to undergo examinations.

Rebecca Reid and Gemma Beilby
Nurses specialized in structural heart disease

The inpatient pathway

Rebecca Reid focuses more on the inpatient side of the work with patients that have consulted their local district hospital and have been referred to St Thomas' for further investigation. She then organizes any relevant tests for the patient, also involving consultant geriatricians since these patients are subject to clinical frailty.

Patients referred with infected heart valves or infected devices are also brought for procedures. Once a full clinical picture has been obtained for the patients, she presents all of the key information to the wider heart team. This includes the referral source, relevant co-morbidities, blood results, coronary angiographic findings, echocardiogram and CT scan results. Once a treatment plan has been determined this is documented and scheduling can occur.

The outpatient pathway

Gemma Beilby coordinates the consultations of any new patient being

seen in the valve clinic. This includes any relevant blood tests, echocardiograms to clarify disease severity and CT scans for structural planning. The ethos is very much of a one-stop clinic where all information can be obtained to ensure a treatment decision and plan can be made with minimal disruption for patients. This becomes relevant when providing services for patients who may live hundreds of Kilometres away from London or be travelling from abroad.

"I provide them with the literature regarding the TAVI procedure and talk them through the pathway so they know what to expect." says Gemma.

"We've been pursuing a major project internally focused on looking at our service and how we can make it better for the patients."

Information on the TAVI procedure itself and the waiting times are provided to the patient, contact numbers and any questions that they have at that point are answered by Gemma.

After the clinic appointment and CT scan, any other outpatient appointments or outpatient exams that are required for them are organized. Then, when the images and reports are all available, Gemma prepares their case to be discussed at

the Heart Team meeting. *"I prepare the slides to be presented there and that's how I move most of the patients through the pathway. I work with our coordinator for scheduling the patients each week, determining who's being listed and for any extras like vascular support or TOE that are needed on the day."*

They are supported by Bina Patel who makes appointments with the patients, and constantly adapts the schedule to plan patient admissions. This involves dynamically responding to patients

who need to be scheduled urgently and explaining the next steps to patients who are on the waiting list. This is always conducted with benevolence to ensure that the overall experience within the pathway is smooth, efficient and above all transparent. □

"It is very rewarding to help get the patient's life back to normal. It gives meaning to what you do."



The numerous thank-you cards sent to the Heart Team.

Getting closer to the intervention



Paula Ghandour
Senior nurse structural heart interventions

Looking closer at the patient care pathway. Once the patient is referred to the hospital, and provided with a one-stop appointment to get examined, the CT scan is reported and the Heart Team makes a decision as to whether or not a percutaneous

treatment is appropriate. Paula Ghandour's role is to liaise with the patient and the team as we get closer to the intervention and to make the patient comfortable to ensure a positive experience with the medical

"My job is really to liaise with the patient and make him or her comfortable and ensure that the experience with us is an agreeable one."

team.

Paula conducts a consultation with the patient and their families one day before the procedure. She goes through all of the steps of the procedure and explains what they should expect. The patient is provided with details on the valve to be implanted, the access route, who will be in the room and what type of sedation he or she will receive. The recovery phase is also explained. This



is important to let them know exactly what is going to happen. She is joined by a consultant or a colleague in case of any questions or doubts that may arise. They also come to be introduced to the patient so they know who will perform the procedure and this is reassuring for them to know the team. Paula comments: *“We make the patient feel part of the team”*.

On the day of the procedure, after joining the Heart Team meeting to review the patient profiles in detail, Paula goes to the cathlab. She positively identifies the patient and supports them.

This is of huge importance to the team

that the patient feels special and is going to be well looked after.

In her scrub nurse role, Paula is extremely concentrated in the cathlab, preparing all steps to have the valve implant safely ready for the physicians to implant. This is definitely a critical step of the procedure and that specialization ensures any action is under control and repeated frequently to provide the best outcome.

Paula is certified for preparing the valve, and also as second operator in line with the proper training to understand what is needed when the valve is deployed. At any step of the procedure, she is able to intervene and

contribute helping with anything that might go wrong, and then assist the doctors.

“It empowers you when you have full training and full understanding of what you’re doing. And there’s nothing more rewarding than having a team that is engaged in what we’re doing”, comments Paula.

Paula has a good understanding of the patient’s symptoms and all the past problems and can then relate these to the team and anticipate any problems that could occur. *“I’ve got a good idea of the patient comorbidities and symptoms and all the past problems. I can then relay these to the team and*

contribute to foreseeing any problems that may occur. For example, if a patient has right bundle branch block and we’ve talked about it in a team brief, I just remind the team that this patient may require a pacemaker.”

As a senior nurse, Paula is always looking to ensure quality: “We have to make sure the standards don’t drop. So that’s the most important part. In this way, the patient has confidence and feels reassured that we will take good care of him or her.”

TAVIs are performed under conscious sedation. The benefit of having less sedation is explained to the patient, and the patient is considered to be an integral part of the team. Also for elderly patients, recovery is quicker and they are exposed to a lower risk of delirium.

The patient is discharged two days after the procedure, and the team has started the “Express TAVI” procedure so patients with pre-existing pacemakers can go home the day after the procedure. The reason behind this

is that patients are kept two days at the hospital to monitor rhythm changes, and those patients who have pacing guaranteed can go home sooner.

Paula concludes: *“Professor Prendergast and Professor Redwood are both very experienced and one of their finest qualities is that they know how to interact with their patients as well as with the team. It’s really the value they give to the whole team. We do what we do so well because we are empowered.”* □

Patient and team safety Dose management



Shelina Sunni
Lead Cardiac Radiographer

The role of the radiographer’s team is vital, since they ensure radiation

safety for the patient and the team.

Shelina Sunni is specifically in charge of ensuring radiation safety and training staff on new equipment to perform procedures with image guided systems. She makes sure operators and the full team are aware of radiation risks and of best practices,

“I enjoy the capabilities and the user-friendly interface of IGS systems.”

which also ensure efficient team work.

Shelina makes sure that ALARA principles are respected, providing the best image quality with the lowest possible dose. Staff must be away from the radiation beam, have a proper lead apron that protects them effectively and use the optimal low dose protocol.

The team here is concerned and aware of radiation dose issues and adopt the recommendation of these experts in radiation, linking to the overall well-defined roles, grounded by the deep trust between the Heart Team members. □

The place of imaging

Imaging in TAVI



Dr. Ronak Rajani
Consultant cardiologist,
Head of the cardiac imaging
department

Cardiac imaging plays a fundamental role in the planning of structural heart disease interventions. Echocardiography is the mainstay in terms of determining the severity of the valve disease and in confirming whether or not a patient has severe

aortic stenosis or not.

Cardiac CT on the other hand is essential for the procedural planning and sizing of transcatheter heart valve devices.

Its emergence has improved their understanding of anatomy and also improved procedural outcomes. With rapid scan acquisition times, it has enabled more patients to be evaluated for device suitability in a quicker time frame. TOE is now used only rarely peri-procedurally for cases where CT has indicated a specific complication

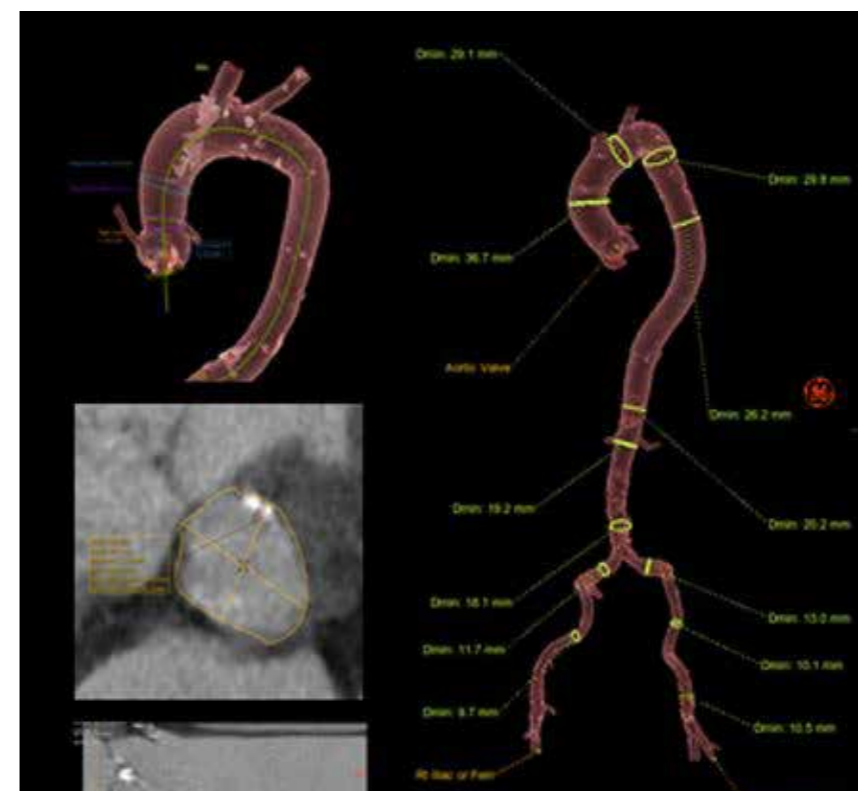
“Imaging has been key in the success of our activity since the beginning, with patient safety as the primary concern.”

risk. Perhaps the most remarkable development of TAVI from an imaging perspective has been in the bringing together of cardiac radiologists and interventional cardiologists to share skills and expertise from different disciplines.

Pr. Prendergast comments: *“In 2019, TAVI without echo guidance has become very routine, and we need to recognize that this is only possible because we learnt so much early on with the help of echocardiography”.*

Echocardiography could quickly identify tamponade, whether the valve was interrupting the function of the mitral valve, a coronary occlusion with region wall motion abnormality, and all could be very accurately seen using this technique.

Dr. Rajani explains: *“The next phase was the evolution from echo to CT. As data emerged, it became clear that gated cardiac CT was the ideal imaging modality for TAVI planning. It provided a wealth of high resolution data on not only the aortic valve itself but also the ventricle, aorta and*



Aortic route segmentation and annulus sizing with Valve ASSIST 2².

peripheral access sites. Nowadays we would rarely consider performing a routine TAVI without a prior CT scan. It helps us to prepare for the intervention, know the valve type and size in advance and to mitigate against complications. As a result of the detailed planning, our interventional cardiologists are able to schedule their cases based upon expected complexity and are able to rapidly deploy valves in routine cases. This results in a more efficient and effective structural heart disease programme.

It has been a very interesting progression in terms of imaging

provision for structural interventions and we were very much a 3D echo based institute but moved very rapidly to incorporate CT into our work stream.

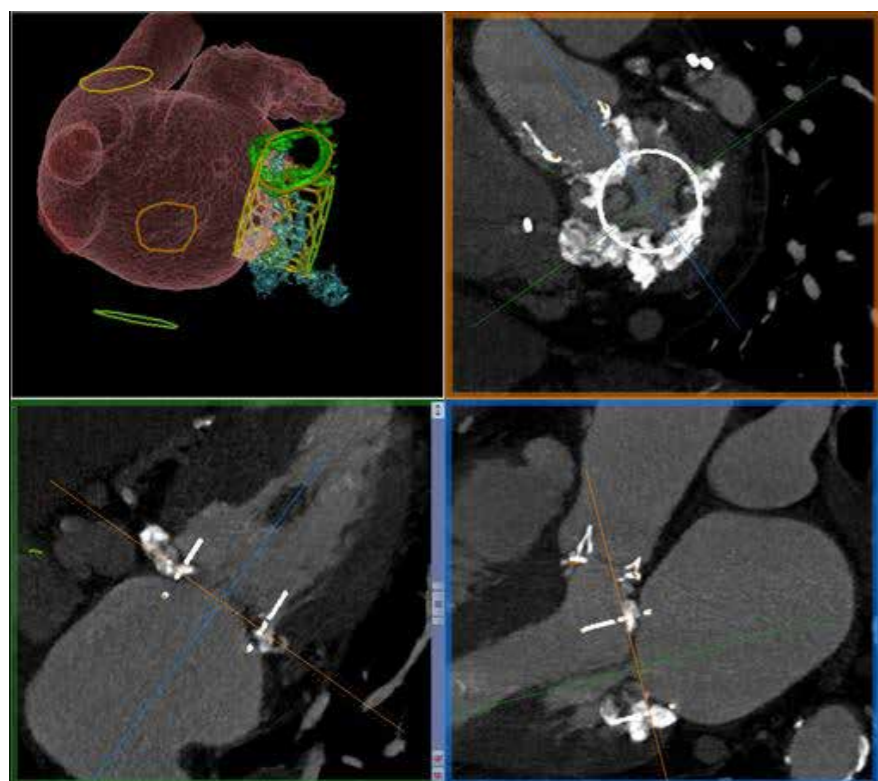
As CT technology improved so did image resolution. This came with the benefit of reduced ionising radiation doses, lower contrast volumes and faster scan acquisition times. The net result was reliable imaging with highly reproducible and accurate results without the need for invasive testing.

Currently about 98% of all of our planning is done with gated cardiac CT scans alone with a contrast volume of

only 60 mls. We currently perform approximately 700 TAVI CT scans per annum which has enabled an upscaling of the number of valves being implanted. This represents a 500% increase in volume over the last 4 years. Currently all of our scans are read by my imaging fellows before each scan is verified by myself. I take personal accountability for every sizing measurement and report issued.

My personal practice as an imaging cardiologist is to provide not only measurements but also guidance to the team. This may take the form of indicating a risk of coronary obstruction, annulus rupture, paravalvular regurgitation or difficult access. Owing to the relationship I have with our interventional cardiologists, I am reassured that any potential concerns prompt appropriate measures at the time of deployment”.

Advanced percutaneous valvular treatments



Segmentation of the 3D CT scanner images of the cardiac anatomy with Valve ASSIST2, including:
- Morphology – Calcification. The predicted position of the prosthesis is provided by FEops³.

The place of imaging modalities in mitral valve procedures

Dr. Rajani classifies the use of imaging for mitral repair and mitral replacement procedures by the transcatheter route into two broad categories: “I think anything that is going to be involving the leaflets alone should always be guided by 3D transoesophageal echocardiography not only for the determination of patient suitability but also for the procedural

planning and deployment of the device. Any device that is going to involve disruption of the annulus or extending into the left ventricle or left atrium, CT is mandatory”.

“Echocardiography is a fantastic technique because you can use the imaging during the procedure to obtain a wealth of anatomical and physiological data.

Cardiac CT on the other hand, provides the most accurate representation of the annulus. With a wide field of view,

isotropic imaging properties and sub 0.5 mm resolution, it also provides the team an ideal medium to appreciate the anatomy of the heart in 3D and see its relationship to adjacent thoracic structures.” comments Dr. Rajani.

The place of imaging modalities in tricuspid valve procedures

Dr. Rajani thinks that the ideal imaging modality for tricuspid valve procedures has not yet been clearly identified. Working in collaboration with industry they first review the specific device characteristics and then determine the cardiac structures that we consider to be the most important in terms of approach and deployment. This is then followed by bench testing of our protocols to ensure optimal imaging on cardiac phantoms before it is used on patients. Dr. Rajani’s role is to obtain the best imaging possible for the task ahead. This often involves protocol refinements as new devices emerge on the market.

If the procedure will disrupt the tricuspid valve annulus, cardiac CT will be required for a slightly different reason to the mitral valve: “Because when you’re disrupting the tricuspid annulus you have to worry about the right coronary artery that’s passing in the right side of the atrioventricular ventricular groove. If you’re just addressing the leaflets themselves such as edge-to-edge repair



Fusion of CT with echo on Vivid E95⁴

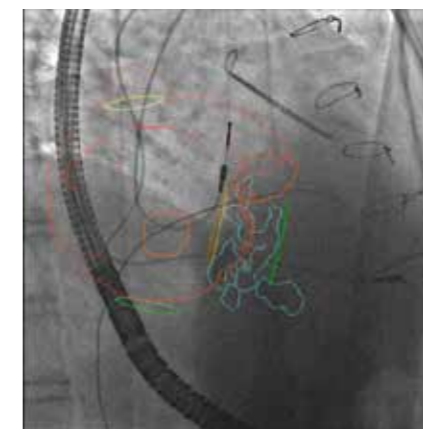
procedures, I don’t think you lose anything by performing a CT scan. Ultimately it is complementary information. The mainstay will continue to be 3D transesophageal echocardiography.”

Fusion imaging experience with Valve ASSIST 2²

The team at St Thomas’ is constantly pushing the limits and treating inoperable patients, treating unusual situations or unconventional anatomies, and this is where image fusion techniques come into their own.

Pr. Prendergast comments: “Beyond conventional CT scanning, fusion Echo with CT and fusion of CT with fluoroscopy is giving us extraordinary information, allowing us to guide much more complex interventions safely, whether complex TAVI or complex Mitral procedures using the transseptal approach and conventional TAVI devices.”

For example, Mitral valve-in-valve, in ring or MAC (Mitral Annular Calcification). These procedures are significantly improved by fusion and



Vivid CT fusion – X-ray fusion in Valve in MAC (using Valve ASSIST 2²): 3D fusion helps guide each step with confidence, from the transseptal puncture to the device deployment.

advanced imaging techniques, providing correlation to understand the spatial relationship of the valve pathophysiology, and guide deployment of the valve.

Dr. Rajani explains: “We have tried to incorporate Vivid CT fusion and X-ray fusion to provide some more anatomical landmarks for potentially complicated patients for our interventional cardiologists. And the feedback, for certain types of procedures where you cannot clearly

see the anatomical landmarks on the fluoroscopy, has been that CT fusion overlay provided great benefit, helping to find the optimal position and angles for deployment.

Where we’ve found it to be particularly useful is in MAC (Mitral Annular Calcification) procedures where the pathway for the implantation of a valve is quite unique. All of our patients undergo a 3D TOE echocardiogram to confirm the mitral valve disease severity. The planning thereafter would be done by a multiphase gated cardiac CT scan and a geometric evaluation by myself to perform some crude measurements as to what I think is the optimal valve that will fit in the mitral valve annulus calcification. This would then be followed by advanced bioengineering with image modeling and computational fluid dynamics to predict procedural outcomes. After the detailed planning, we use CT fusion techniques to perform the deployment.”

The fusion imaging enables, Pr. Redwood and Pr. Prendergast to know where exactly to implant the new valve. A lot of planning is done in advance to make sure they obtain a

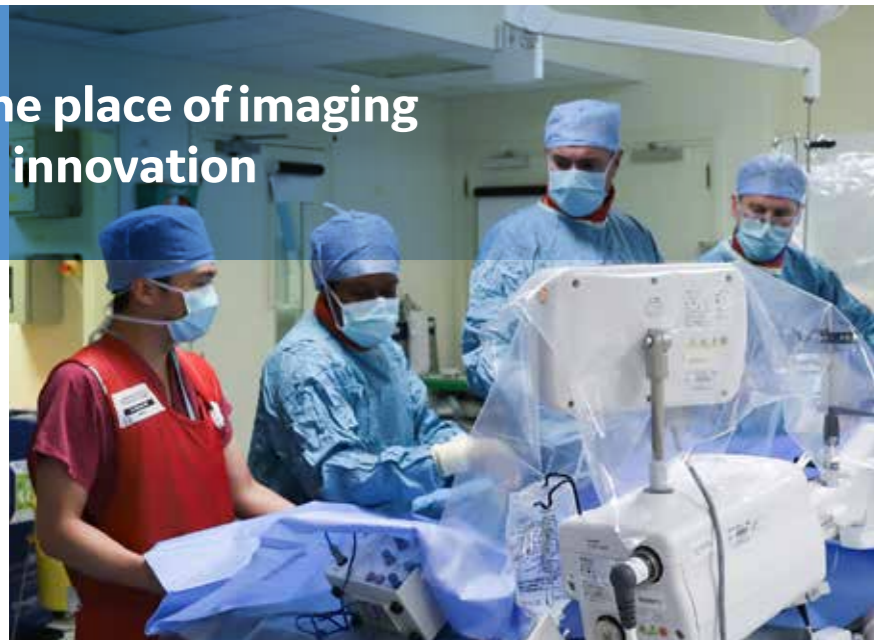
good procedural outcome. This gives us the reassurance that the risk of outflow obstruction is small and that paravalvular regurgitation will be minimal provided that the valve is deployed within the marked target zones. Providing that information to

the interventional cardiologist without disrupting their workflow, and then just following the dots implanting the device and using their skill is a fantastic ability.

"We know that even in the best centres

in the world the mortality rate at one year is about 50% for these types of procedures. It is therefore of critical importance to make sure we provide the best outcomes for the patient." explains Dr. Rajani. □

The place of imaging in innovation



electrocardiography. On the other hand cardiac CT can provide fantastic information regarding the anatomical arrangement of the relevant surrounding structures of the tricuspid valve, including the right atrium, the SVC, the IVC as well as the right ventricular morphology and the right coronary artery anatomy. Introducing imaging at a very early stage with regard to the new devices is key.

At St Thomas' Hospital we have a very open culture where interventional cardiologists are very open to new ideas and to try new technologies, whether that is imaging, devices, or a new procedure or a particular approach to perform a structural intervention.

I think cardiac imaging was historically the silent partner in the heart team. I think they are now becoming an equal partner in the team, and getting an increased level of exposure through the numerous structural conferences." □

Dr. Rajani explains: "We have very experienced interventional cardiologists at St Thomas's Hospital who have not been reliant on CT fluoro-fusion imaging at all in the past. I think you only need to have one case that doesn't go quite as you anticipated to question whether or not this could have been avoided with the aid of advanced imaging.

So our policy and my philosophy at St Thomas' is that whenever a new procedure is being introduced to St Thomas' Hospital, the first thing that will happen is that I get an invite from Pr. Prendergast and Pr. Redwood to

attend the meeting with industry, so we can start thinking from an imaging perspective as to what challenges may arise for the interventional cardiologists.

Even if there is no technical limitation, there is often something that we can provide from the imaging perspective that may not have been thought about by industry.

As we are speaking about new devices to treat the tricuspid valve, we know this is not very well imaged by trans-oesophageal

Growing the next generation

A key component of St Thomas' activity is education. While each of the team members coach and teach the next generation, young doctors bring a lot of support and also learn from their experienced peers. This is of importance to both share the knowledge, train future experts and grow the international network, whilst also making sure the best doctors in the UK are trained continuously to one day take over locally to serve the population.

Fellows from all around the world are

applying to join St Thomas' Heart Team. Pr. Redwood and Pr. Prendergast are here to provide the best possible supervision, and support the fellows and the team in their practical and scientific activities.

"Equally, in return, fellows provide significant support to the programme. They work hard to support us during the procedure, behind the scenes working with the patients and the nurses, and this is a very beneficial partnership." comments Pr. Prendergast.

While the team welcomes international fellows, it needs to develop their own homegrown specialists in the UK as well.

"We also encourage our own fellows to work in international expert centres in other countries to grow their experience" says Pr. Prendergast.

Cardiac imaging is also part of the trainee programme to help them understand transthoracic echo, trans-oesophageal echo and cardiac CT techniques.

Perspective of an international senior fellow



Dr. Heath Adams
Consultant cardiologist,
senior fellow

Heath Adams is a fully qualified interventional cardiologist who studied in Australia at the University of Tasmania, and at St Thomas' for a 12-months clinical fellowship.

Dr Adams is fully part of the team here, and is spending two days a week in the cathlab, involved in structural heart procedures and one day in the lab performing PCI procedures. He is also involved in the clinic's activities to see patients for workup for TAVI as well as post intervention, and also other cardiology disorders.

When in the cathlab, he is an integral team member. *"The support is quite amazing both from the nursing and the physician's perspective and definitely makes our lives a lot easier"* says Dr. Adams.

TAVI procedures have now become very streamlined and can be safely performed in less than 30 minutes with a good outcome.

"What I find different here is the broad scope of challenging cases, such as patients with peripheral vascular disease or very high-risk patients with challenging anatomy. The Heart Team here is very well equipped to give the

best possible outcomes to the patient, and I have certainly learned a lot from them.”

Pr. Prendergast and Pr. Redwood share their experience and provide comprehensive mentoring. The environment here is very safe since we work under very close supervision. “I have a great relationship with them. They’re extremely supportive.” says Dr. Adams.

He is also involved in the imaging component that mainly relies on

echocardiography and CT and thinks this is key to having appropriate safety measurements.

“Dr. Rajani and his team are doing a fantastic job and are getting us quality images and quality measurements for performing the TAVI procedure”. When Dr Adam first arrived, he was enrolled by Dr. Rajani into his 5-day London Cardiac CT Academy and taught the basics about how to perform the measurements with regard to TAVI. “The procedural planning is a major step to prevent complications and get

a great outcome for the patient”.

Certainly, lessons learned overseas are very valuable. Dr. Adams believes that heading home he’d be very keen to apply the transferred knowledge, and why not one day, teach the next generation, mirroring the work of the mentors he has today in the UK. □

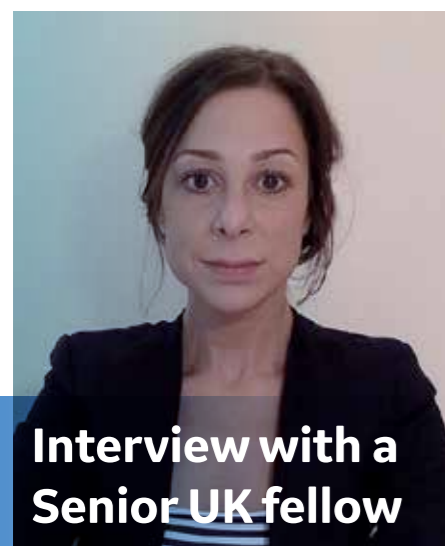
carry out ground-breaking first-in-man procedures and cutting-edge research. Many centres in the UK refer to the Valve Team at St Thomas’ for their expert opinion and interventional skills.

Why have you chosen to be trained on structural heart percutaneous treatments?

Transcatheter heart valve intervention is a rapidly expanding field and there is a huge unmet need. More recent randomized control trial data suggest TAVI is at least as good as surgical AVR in certain cohorts of patients and there will be a great demand for Interventional Cardiologists who can perform structural interventions in the next few years.

How are you involved as a fellow with patient management? Please describe your typical day

No one day is the same, in addition to being on call for our primary angioplasty service, I perform ward rounds, multidisciplinary team meetings, co-supervise PhDs, perform



Interview with a Senior UK fellow

Tiffany Patterson
Senior UK Interventional Fellow

Please introduce yourself and explain your background

My name is Tiffany Patterson and I’m an NIHR academic clinical lecturer and

Interventional fellow in Cardiology. My current research interests include structural valve degeneration, coronary and LV physiology and out-of-hospital cardiac arrest. I trained at St Bart’s and The Royal London School of Medicine, and graduated with an MBBS (Hons) in 2005 and BMedSci (Hons) in 2004. I trained in Cardiology at St Thomas’, Hammersmith, Royal Brompton and King’s College Hospital and completed a PhD in Cardiovascular Sciences in 2017.

Why did you choose the interventional cardiology specialty?

Interventional cardiology is a fast-paced specialty and you can make a difference to patients’ lives. Our day-to-day practice is very evidence based with advances in Interventional Cardiology rapidly translating from bench to bedside.

Why at St Thomas’?

The team at St Thomas’ is forward thinking, friendly and supportive. They

structural and coronary interventions and am PI for a multicentre randomized control trial.

Can you speak about the key lessons acquired here with the St Thomas’ Heart Team?

Patient care is at the forefront at St Thomas’, we treat patients and relatives with respect and deliver the highest quality care possible

Can you elaborate on the technical aspects you are learning?

The training in Structural Interventions at St Thomas’ Hospital is second to none. We have the opportunity here to learn novel interventions and techniques that only happen in a few centres in the world. We are trained in mitral, tricuspid and aortic valve interventions and have the opportunity to be involved in live case

transmissions to international conferences.

Can you speak about your interactions within the Heart Team?

The Heart Team functions very well, and is a cohesive and collaborative environment, with measured patient-centred decision making.

How do you see the place of imaging in your interventional work?

Imaging is fundamental to structural heart interventions. We are fortunate enough to have fantastic imaging expertise at St Thomas’ which guides decision making and also now helps guide procedures in real-time.

What will be next step for you right after your fellowship?

As a clinical lecturer, I’m in post for another two years, but I aim to continue an academic/research component to complement structural and coronary interventions.

Where do you see yourself in 10 years from now?

I aim to build on my current coronary and structural learning and expand my research programme.

Where do you think the structural heart programmes will be in 10 years?

Structural heart programmes will rapidly expand over the next 5 to 10 years due to huge unmet needs. Valve design will continue to improve and the procedures will become more straightforward. □

Training the Heart Team community – the cradle of transcatheter valvular education

The first live case TAVI meeting – London Valves live - was set up by a small group of interventional cardiologists in 2009: Pr. Simon Redwood and Dr. Martyn Thomas were joined by others from London, including colleagues from King’s College Hospital, and Philip Bonhoeffer who implanted the first pulmonary

valve a few years previously.

800 people attended the first meeting, everybody was in the same auditorium in a hotel just in front of St Thomas’ Hospital.

Pr. Prendergast explains: “London Valves Live ran independently for 3

years and then joined with the PCR family of educational programmes to become PCR London Valves. The meeting now attracts over 3,000 participants from all over the world and partners closely with PCR valve meetings in China and Japan”. □

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1. The FORTIS valve is not for sale in any country. Refer to legal team for remaining risks.

2. Valve ASSIST 2 solution includes TAVI Analysis, HeartVision 2 and requires AW workstation with Volume Viewer, Volume Viewer Innova. These applications are sold separately. Refers to features of Innova IGS 5, Innova IGS 6, Discovery IGS 7 and Discovery IGS 7 OR

3. FEops HEARTguide™ is available on the European and Canadian market with indication for use in TAVI and LAAo. Outside Europe and Canada, FEops HEARTguide™ is only available for non-clinical use.

4. Optional

Experts perspectives

Experiences of Doctor Augustin Coisne and Professor Erwan Donal

Mitral valve replacement and repair is now beginning to take-off with a vast array of new techniques and imaging tools.

Two experts in cardiovascular ultrasound provide their perspectives on the Heart Team, the role of this imaging modality and specific innovations.



Dr. Augustin Coisne

MD, PhD, Lille University Hospital, France

Co-lead of the imaging part section of the Heart Valve Centre

EACVI HIT (European Association of Cardiovascular Imaging - Heart Imagers of Tomorrow) Ambassador for France

Vice-President of the Young Group of the French Cardiovascular Imaging Society



Pr. Erwan Donal

MD, PhD, Rennes University, France

Head of the echocardiography Laboratory and of a hospitalization unit of 26 beds of general cardiology in the department of cardiology

Executive board member of EACVI (European Association of Cardiovascular Imaging)

President of French group of cardiovascular imaging, SFC French Society of Cardiology

Who are the members of your heart team?

Dr. A. Coisne: Our Heart Team is made up of many people! To summarize (non-exhaustive list): cardiac surgeons (Dr. Modine, Pr. Vincentelli and Pr. Juthier), interventional cardiologists (Pr. Van Belle, Dr. Sudre), cardiologists specialized in cardiac imaging (Pr. Montaigne and myself), cardiovascular radiologists (Dr. Pontana, Dr. Longère), heart failure specialists (Dr. De Groot and

Dr. Fertin) and anesthesiologists.

Pr. E. Donal: Our heart team is made up of heart surgeons, anaesthesiologists, interventionists, heart-failure and cardio-vascular imagers. We all meet on a weekly basis.

What is your experience in structural heart interventions?

Dr. A. Coisne: I routinely perform transcatheter mitral valve repair (MitraClip®, Abbott), valve-in-valve, valve-in-ring and LAA closure. I also had the chance to realize the first

TMVR with the investigational device from Abbott, one of the first TMVR System with Transfemoral Transseptal Approach from Medtronic, the first transcatheter mitral valve repair with the Amend system of Valcare Medical in Europe and the first in-human valve Transseptal Mitral Valve Replacement System.

Pr. E. Donal: We have a large valvular program, and are implanting MitraClip® (Abbott) every two weeks (2 to 3 patients each time), we started triclips, we did 7 percutaneous

prosthetic mitral valves (HighLife - HighLife Medical, the investigational device from Abbott) in the hybrid room.

We have TAVI quite every days, para-valvular leaks percutaneous closures, septal myectomy, LAA occlusion, PFO closure, ASD closure...

How important is communication within the heart team?

Dr. A. Coisne: Communication within the Heart Team is the backbone of all structural heart interventions. We strive to have clear and accurate communication using a common language and vocabulary, sharing our knowledge in a relationship of trust and having an optimal position in the operating room. The final goal is to minimize risks, better manage complications and increase success rates in our patients.

Pr. E. Donal: Communication within the heart team can be considered no less than KEY, fundamental. No communication leads to misunderstandings that in turn leads to incorrect indications and inappropriate treatment. So this is something we highly care about in our daily practice. We try to promote the additive value, the skills of each component of the team. It is not just a team for helping the interventionist... It is a team that is working together for the success of team as a whole in dealing with the sometimes-complicated patients we face today. In that goal of improving the communication, the quality of the images, the quality of the way we display them is again, fundamental.

How do you see the place of echocardiography in this domain?

Dr. A. Coisne: In structural heart

interventions, above all in mitral valve disease, echocardiography and multimodality imaging are mandatory to perform an accurate screening, guide the procedure step-by-step and perform an appropriate follow-up. Finally the aim is to choose the best therapeutic solution for the patient and to increase the short and long-term success of the intervention.

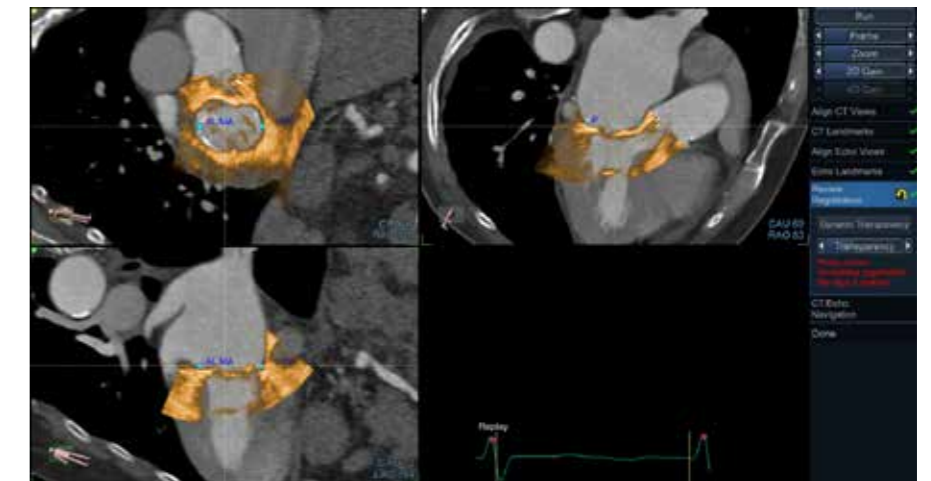
Pr. E. Donal: The role of echocardiography is fundamental; we have a crucial role for the screening, the planning, and guiding of the intervention, the post-operative assessment of the results and the follow-up. It requires skills, collaboration with the other

with the new R3.

Pr. E. Donal: I find it convenient, robust, with good image quality in TTE and TEE with nice software's and 3D capabilities for the echoLab but also the cathlab. Always nice to use flexi-slice to navigate into the volume and across the valve, the appendage or whatever!

What do you think of CT scanner and echo fusion imaging?

Pr. A. Coisne: Nowadays, both CT scanner and echo are mandatory for several types of structural heart interventions including TMVR. Fusion imaging between these two modalities



CT echo fusion with Vivid E95

components of the team but also expertise in echocardiography with the highest possible quality, to ensure the best possible outcomes for our patients. Of course echo is important but multi-modality imaging and clinical expertises are a must!

What is your experience with Vivid E95?

Dr. A. Coisne: I have been performing all structural interventions with Vivid E95 R2 for 3 years and now for 1 year

is a promising tool in three ways:

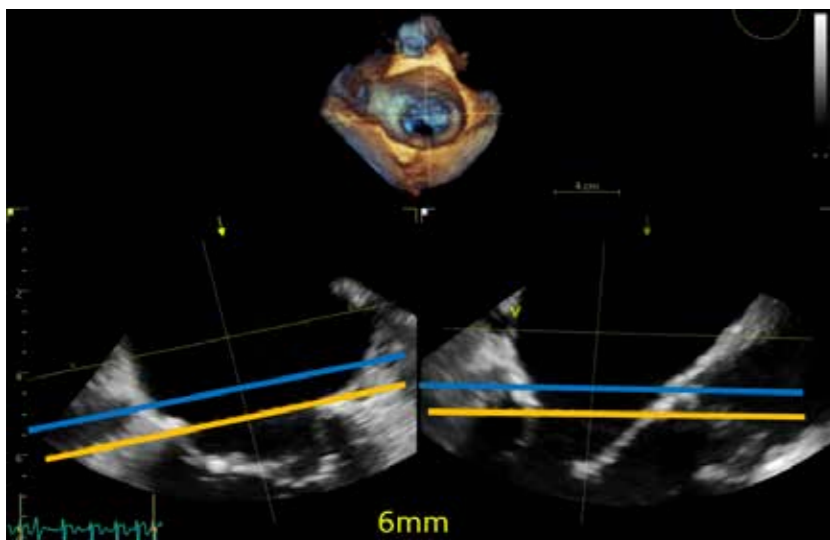
1. crossing of the mitral annulus plane with the prosthetic system while avoiding the sub-valvular apparatus.
2. final check of the position of the prosthesis before and during definitive deployment.
3. LVOT impact after deployment of recapturable and retrievable prosthesis.

I see the applications of this technology mainly for TMVR and LAA

closure.

Pr. E. Donal: This is exciting because we have used to implant the investigational TMVR device from Abbott. It provides a significant added value for assessing the neo-LVOT. Depending on the evolution, we might use it in a near future for Triclip, or para-valvular leak closure procedures. All the procedures we are guiding can be considered challenging.

Could you tell us how you use some of the Vivid E95 features, such as 4D markers, FlexiViews and the new FlexiSlice?



Defining the optimal landing zone for the device 6mm from the mitral ring (Live FlexiSlice with distance control)

Dr. A. Coisne: I use all Vivid E95 features (4D markers, FlexiViews and FlexiSlice) during all steps of structural heart interventions. When we are planning the intervention, in the OR to improve the communication, to save time and be more precise in the evaluation of anatomical characteristics both during the delivery and the evaluation of the result of the intervention.

Pr. E. Donal: 4D markers are

interesting, FlexiSlice is really convenient for planning but also live, during a triclip intervention for instance.

What is your view on the future of Echo in structural heart interventions?

Dr. A. Coisne: In my opinion, the place of cardiologists specialized in cardiac imaging is of paramount importance within the Heart Team dedicated to interventions in the same way as other doctors. He/she has extensive knowledge of valvular heart diseases and its related literature, and have

been coordinating their teaching for many years. Given their key role in patient screening, intervention and follow-up, they have a central place in these interventions. Moreover, the improvement of imaging techniques and the development of percutaneous interventions require close collaboration and the ability to use different imaging modalities at different steps of the procedure (echo, fluoroscopy, CT-scan...). For this,

Echo-CT Fusion and Valve-Assist appear to be useful tools in structural heart interventions.

Pr. E. Donal: I hope we will continue to build on this expertise of all team members. I believe 3D ICE capability could bring some value of course but we need to remain careful how to use it. Having the imager in the operating theatre together with the knowledge of the patient, the pre-operative images and who will follow the patient afterwards, is certainly important for the understanding of the incomplete results and for increasing the success rate of the procedures we are performing more and more frequently month after month.

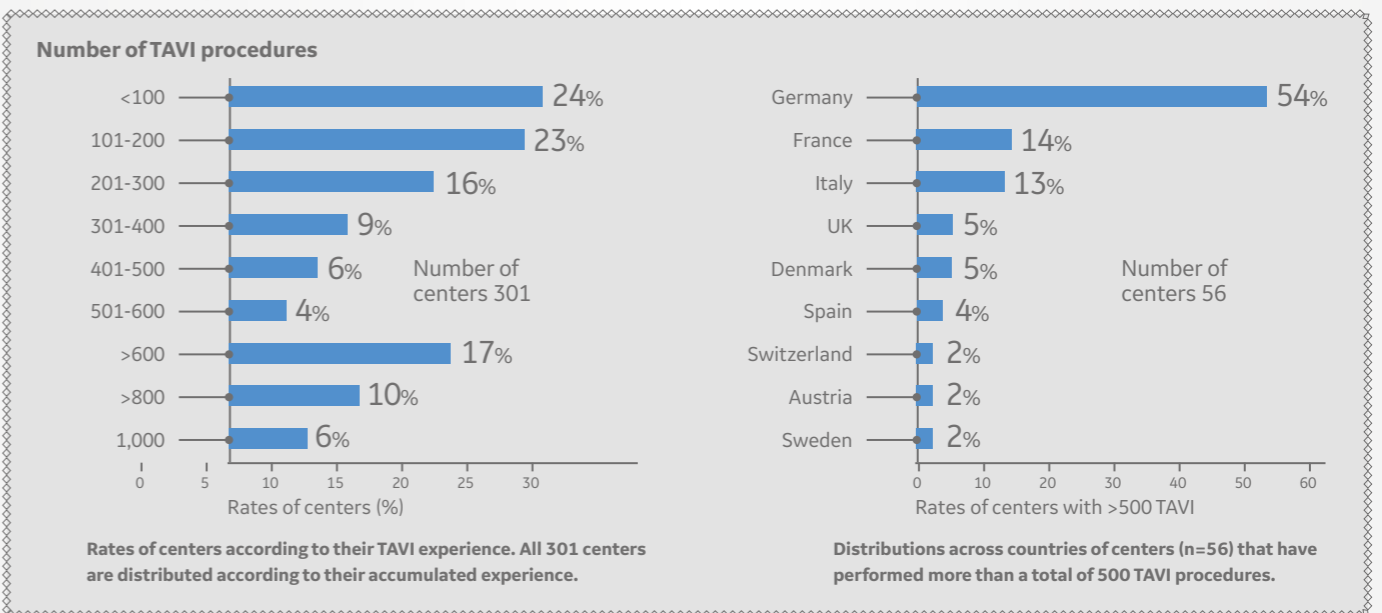
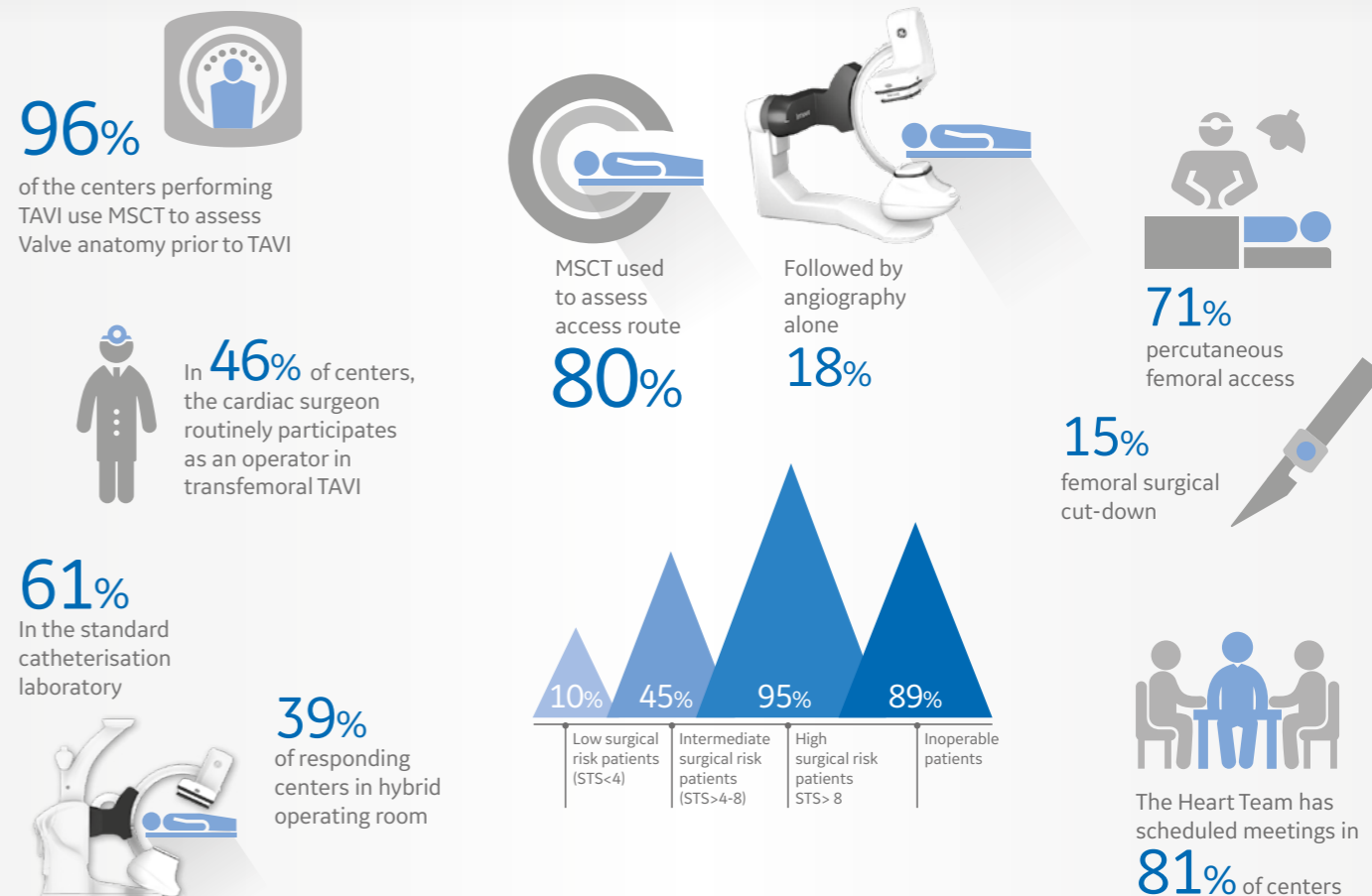
So the new field of intervention that we are moving into now requires good echocardiographies, fusion images and good interaction between people who respect each other. The team spirit is key and echo, imaging is so important that it would be of mutual benefit that EACVI (European Association for Cardiovascular Imaging) would be more present at interventional meetings such as the PCR London Valves course. □

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FOCUS ON TAVI

Extracts from: Current status of transcatheter valve therapy in Europe - Results from an EAPCI survey



Sources: Extracts from current status of transcatheter valve therapy in Europe: results from an EAPCI survey. EuroIntervention 2016;12:890-895

CardioGraphe® ASiR CV 14 cm Coverage TAVI examination

Courtesy of Dr. Patrick Donnelly, South Eastern Health and Social Care Trust Ulster Hospital, Belfast (Northern Ireland)



Dr. Patrick Donnelly
 Cardiologist

“A complete assessment of the aortic valve & whole aorta to understand the suitability for TAVI device deployment is possible on patients with challenging heart rates.”

Clinical Case

A 72-year old male. TAVI CTA examination performed to assess the severe Aortic stenosis for TAVI work up versus AVR.

Imaging

Gated heart and ungated thoracic and abdominal Aorta combined in one study using a single injection of contrast media followed by saline.

The patient was imaged with a ECG arrhythmia with a range of 61 – 125 BPM.

Figure 1

Imaging of the Aortic valve demonstrates a Bicuspid Aortic Valve and the presence of heavy calcification affecting both the anterior and posterior cusps.

Figure 2

Annulus diameter measurements.

Figure 3

Recording of ECG.

Figures 4 & 5

Imaging of the whole Aorta demonstrates the presences of atherosclerosis in the Thoracic and Abdominal Aorta. In the Abdominal Aorta there is significant mural thrombus and evidence of a mild to

moderate stenosis with greater severity inferiorly. The mural thrombus extends into the ilio-femoral system and a stent is visualised in the left iliac artery close to the Aortic bifurcation neither artery appears to be suitable as an access routes for device deployment.

TAVI Assessment

Patient History

- A 72-year old male
- Heart rate 61 – 125 BPM

Injection

- 90 mL at 6 mls/s iodinated contrast
- 50 mL Saline at 6 mls/s
- Smart Prep – bolus tracking

Acquisition

- Single Beat
- 14 cms Coverage
- Whole Aorta 5 x 14 cm

Auto Reconstruction

- Systolic gated acquisition at 45% of R – R
- Ungated whole Aorta
- TAVI software assessment of Aortic valve and whole Aorta



Fig. 1 Bicuspid Aortic Valve

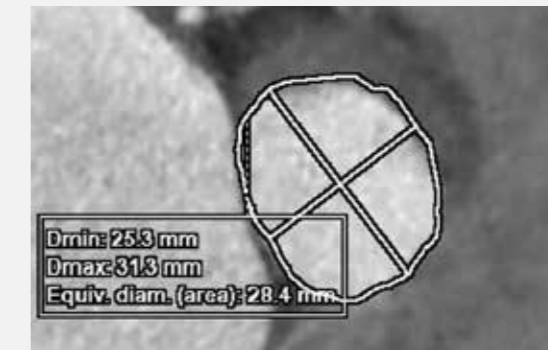


Fig. 2 Aortic Annulus measurements

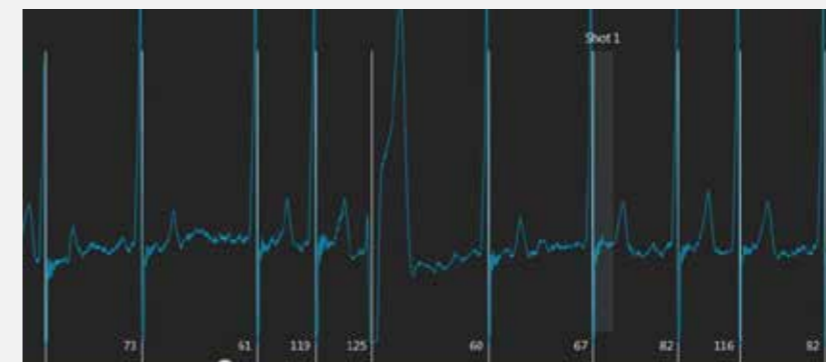


Fig. 3 ECG Heart rate arrhythmia

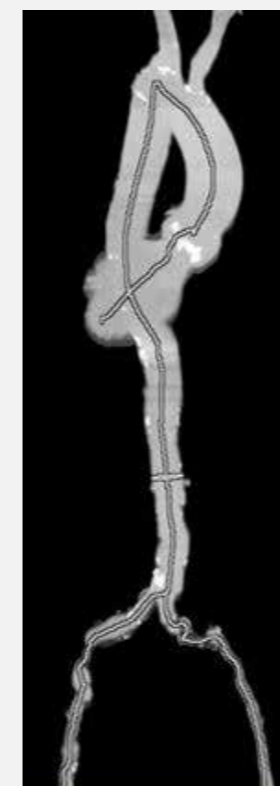


Fig. 4 MiP with automated centre line tracking

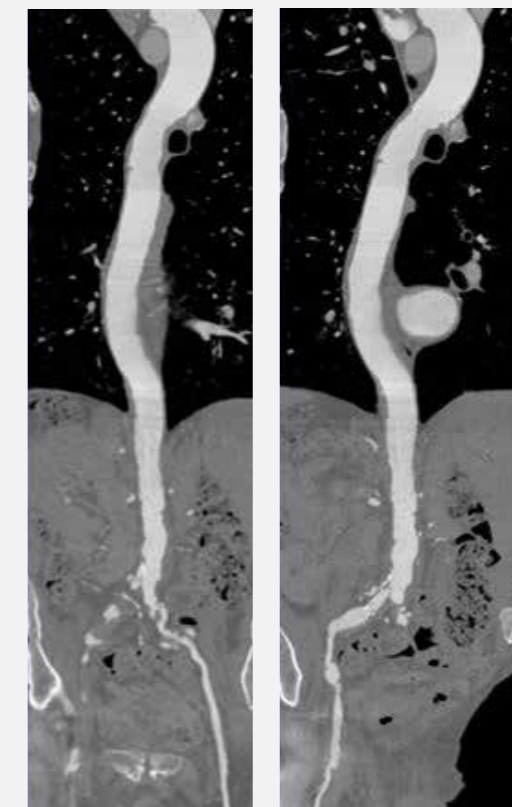


Fig. 5a & 5b Curved reformat of whole Aorta & right and left Ilio femoral Arteries

Clinical Benefit

A single examination can be performed assessing the Aortic Valve and the whole Aorta to assess the access route for TAVI procedures. For this patient imaging demonstrated that neither ilio-femoral route was suitable for access. Full assessment of the Aortic valve and measurements of the annulus, ostial heights, sinus of Valsalva and LVOT were possible regardless of the significant cardiac arrhythmia.

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INTERACT View X

Enhance communication of the Heart Team

The growth of minimally invasive surgery for ever more complex clinical cases requires the use of imaging modalities in the interventional suite: MRI, CT, or ultrasound. INTERACT combines the capabilities of multiple imaging technologies, connecting them to unlock their full potential and uniting the forces of advanced imaging to fight on behalf of outstanding clinical outcomes.



CardioGraphe™

The only dedicated cardiovascular CT

For first-line individualized
decision-making in CAD





GE Healthcare

GE Healthcare provides medical technologies and services to help solve the challenges facing healthcare providers around the world.

From medical imaging, software, patient monitoring and diagnostics, to biopharmaceutical manufacturing technologies, GE Healthcare solutions are designed to help healthcare professionals deliver better, more efficient and more effective outcomes for more patients.

GE Healthcare is betting big on digital; not just connecting hospital departments and physicians more effectively, but utilizing the masses of data from its equipment and the collaboration between hardware and software – “digital industrial” – to help clinicians make better care decisions. Sensors, software and smart data analytics are converging to enhance GE Healthcare’s offerings not just in diagnostics, but also pathology, gene sequencing and even hospital asset tracking.

GE interventional imaging systems help you plan, guide and assess your wide range of interventional procedures precisely and efficiently. The new generation of ASSIST advanced applications allow you to extend your clinical capabilities and help simplify and streamline your procedural workflow.

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