

# Case Notes

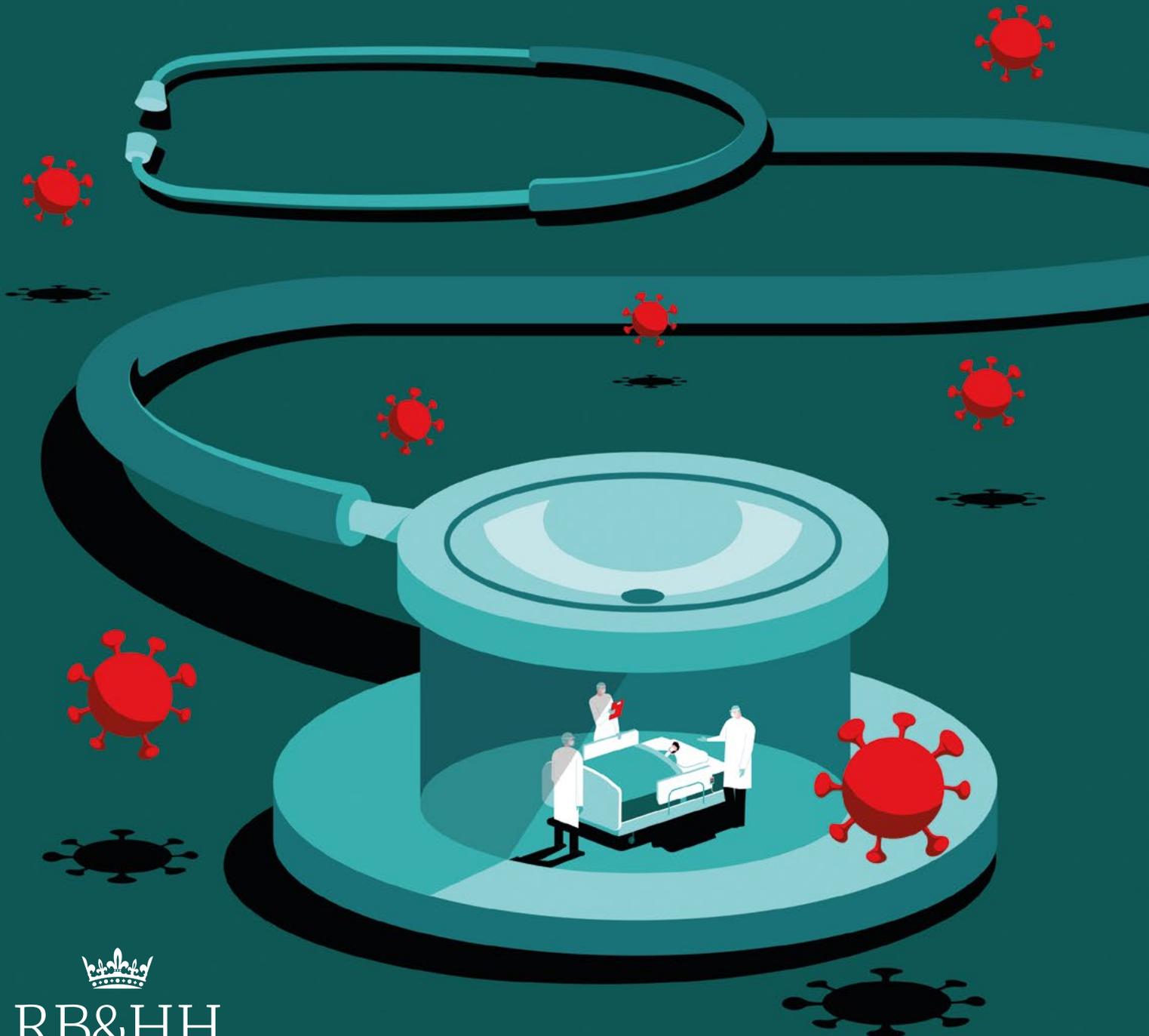
Royal Brompton & Harefield Hospitals Specialist Care

BEATING HEART BYPASS  
FOR A HIGH-RISK PATIENT

SHOCKWAVE IVL

LUNG CANCER  
DIAGNOSTIC  
BREAKTHROUGH

## OUR COVID-19 RESPONSE





## Welcome to the Summer 2020 edition of Case Notes

Every day, private patients are referred to our hospitals for the exact same reason: to be seen by the world's leading experts in heart and lung care.

From our diagnostic specialists, to our doctors and nurses, every member of our multi-disciplinary team has dedicated themselves to a lifetime of advancement in this field. They're the innovators and thought leaders.

For example, we're advancing minimally-invasive surgery and transcatheter procedures, where the heart and lungs can be accessed and treated through smaller access points than in traditional surgery. This leads to improved recovery and smaller, neater scars.

In this edition of Case Notes, you can read about how we responded to the COVID-19 pandemic on page 4, how Mr Shahzad Raja performed a beating heart bypass for a high-risk patient on page 8, and on page 14, about how we're using a new, safer tool to diagnose lung cancer.

If you have any questions about our services, or would like to refer a patient, please get in touch. We'd be delighted to hear from you.

### David Shrimpton

Managing director, RB&HH Specialist Care



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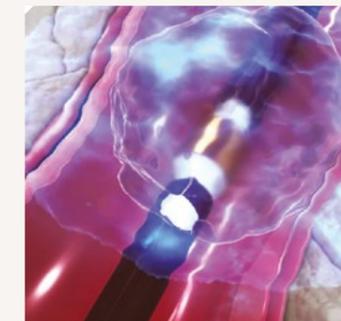


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# What's new?

## PULMONARY REHABILITATION TEAM CELEBRATE NATIONAL FIRST

The pulmonary rehabilitation team at Harefield Hospital has become the first service in the country to receive full accreditation in a scheme run by the Royal College of Physicians (RCP) in association with the British Lung Foundation and the British Thoracic Society.

Patients with long-term respiratory conditions often face shortness of breath, which can make it difficult to move around and carry out day-to-day activities without getting breathless. Pulmonary rehabilitation helps patients manage this through a tailored programme of exercise classes and education workshops designed to build their tolerance of physical activity and improve their quality of life.

Dr Claire Nolan, senior research physiotherapist, said: "It's a mark of quality which we can highlight to clinical referrers and commissioners, to be the first, and currently only, team to have met these standards. We can be proud that the clinical service we provide is second to none."



New director of medical education, Dr Beverley Tsai-Goodman

## NEW DIRECTOR OF MEDICAL EDUCATION APPOINTED

Dr Beverley Tsai-Goodman, consultant paediatric and foetal cardiologist, has been appointed director of medical education.

Dr Tsai-Goodman has worked at the Trust for three years, having previously worked as a consultant in Bristol for almost 13 years.

Commenting on her new role, she said: "One of the things that attracted me to the Trust was its reputation as a leading teaching hospital within the UK and worldwide, and I was impressed that one of the Trust's organisational values is based around sharing our knowledge through teaching so that we can help patients everywhere. I have always had a keen interest in medical education and am really looking forward to leading this vital programme."



## CONSULTANT RECEIVES OUTSTANDING SERVICE AWARD

Professor Roxy Senior, consultant cardiologist and director of echocardiography at Royal Brompton Hospital, has been presented with an award for outstanding service by the Indian Academy of Echocardiography (IAE).

He received the award at the academy's silver jubilee celebration conference, Echo India, held in Kolkata.

He said: "I originally came from India – studying at the University of Calcutta (now Kolkata) and graduating with a master's degree in medicine and cardiology before moving to the UK to develop my career. For that reason, I was particularly delighted to be presented with this award. It made me feel very humbled and proud."



Professor Senior receives his award from Dr Nitin Burkule (left), past president of the Academy of Echo. Professor H.K Chopra (second right), president of the Cardiological Society of India, and Dr Rakesh Gupta (far right), past president of the IAE.

## GUYS AND ST THOMAS' AND ROYAL BROMPTON & HAREFIELD NHS FOUNDATION TRUST MERGER

Since 2017, Guy's and St Thomas' and Royal Brompton & Harefield NHS Foundation Trust have been working together with colleagues across King's Health Partners to develop plans to transform care for people with heart and lung disease.

The two Trusts have a long history of being at the forefront of patient care research and the boards of both Trusts are confident that by formally bringing together the organisations and shared expertise, they can significantly improve care and outcomes for people with cardiovascular and respiratory disease.

This ambitious venture, in partnership with King's College Hospital NHS Foundation Trust and our academic partners, will create a centre of national excellence for the care of adults and children, which will sit at the heart of a population health system working together to significantly reduce the burden of these conditions.



Guy's and St Thomas' and Royal Brompton & Harefield NHS Foundation Trusts formally agree to merger.

## CYSTIC FIBROSIS TEAM WINS HSJ AWARD

The Trust's cystic fibrosis team were awarded a Health Service Journal Partnership Award in February for their work in establishing a new service with digital health start-up, NuvoAir.

Key to the new service is the NuvoAir spirometer, a device that can be used at home to measure lung function and, via Bluetooth, allows the results to be seen on patients' mobile phones or tablets.

Royal Brompton's consultant nurse in cystic fibrosis, Dr Susan Madge, said: "Patients were the driving force for this partnership and were at the centre of the design and build process. We wanted to put adults with CF back in the driving seat, to let them have ownership of their data and deliver virtual consultations to lead the way in changing the care delivered to adults with CF."



Members of the CF Team with representatives from NuvoAir

# Our COVID-19 response

**A**s a specialist heart and lung hospital, we made a number of changes across our private and NHS services to ensure we could support the NHS response to the COVID-19 pandemic and keep all our patients safe.

## WE HELPED INCREASE CAPACITY AND SAVED LIVES



As well as our Trust's NHS services, we re-purposed some of our private patients facilities and re-deployed select members of our team to swiftly create the necessary capacity for the Trust in March 2020.

This helped provide treatment to some of the sickest patients affected by the virus at our specialist centre, whilst maintaining an operational service for our private patients.

With our combined capacity and the skills of our specialist teams, we helped many COVID-19 patients recover and return home to their loved ones, and continue to do so.

## WE INCREASED ECMO SUPPORT



As one of only five ECMO (extracorporeal membrane oxygenation) centres in the UK, patients with the most

severe respiratory failure were sent to us from other NHS Trusts.

In a video produced by Channel 4 News, viewers were taken behind the scenes to see how the sickest patients are treated with this game-changing life support technology. It takes over the function of their heart and lungs to help them recover from the virus.

In response to the pandemic, we have tripled our ECMO capacity to the highest in the country – and intend to increase it further still.



*I will encourage our local teams to do it like the Brompton. Despite the pressure the [ECMO] teams are under, they displayed excellent patient care, helping with the transfer and maintained a friendly demeanour under the PPE.*

*The reception we received from everyone was frankly outstanding. Given the pressure the staff must be under I was amazed at how friendly, caring and happy the entire team were. This was a shining example of care and efficiency.*

Acute care medical director for South Western Ambulance Service.



## WE MAINTAINED PRIVATE SERVICES



We have developed innovative ways to continue providing much needed private patient care.

### New video consultation service

Our remote video consultation service mirrors face-to-face clinics with our consultants, to keep your patients safe. We have also contacted all major private medical insurers to ensure these consultations can be covered during this time.

### Diagnostics and outpatients always available

77 Wimpole Street, our dedicated outpatients and state-of-the-art diagnostics facility, has always been and continues to be a 'green zone' during the pandemic. This means that we have put in place a range of stringent measures to keep your patients safe so they can continue being assessed and treated in-person, including for cancer and neurology diagnostics.

### Harefield Hospital is a dedicated cardiac centre

As of writing, Harefield Hospital remains one of only two dedicated cardiology hospitals in London. In addition to our resident experts at the hospital, our consultants from Royal Brompton Hospital continue to attend clinics and perform urgent procedures here (whilst Royal Brompton remains a COVID-19 centre).

## WE DISCOVERED AND ADVISED



The Trust's involvement in the RECOVERY (Randomised Evaluation of COVID-19 Therapy) study continues to

support the global research efforts to find effective treatments.

Our experts recently discovered a strong association between the infection and the development of blood clots in the lungs, leading to new NHS England treatment guidelines.

Our consultants also provided and continue to provide regular COVID-19 advice throughout the pandemic to help protect public health.

## AND WE WILL CONTINUE



The pandemic is not over yet and won't likely be for some time. As a private patients service, we

will continue to support the NHS to treat all COVID-19 patients who need specialist care, whilst ensuring our private patients can continue their heart and lung treatment with us.

As the infection can leave patients with ongoing respiratory and cardiac issues, our consultants and physiotherapists have already helped many private patients with their rehabilitation.

For further details about what services are currently available or to refer a private patient, please contact the customer services team on **+44 (0)20 3131 0535** or email [privatepatients@rbht.nhs.uk](mailto:privatepatients@rbht.nhs.uk)

*Our specialist physiotherapy team ready to enter COVID-19 areas at our hospital. They all attached a photo of themselves to help our patients visualise who is helping them.*



# OUR NEW CONSULTANTS

As the UK's largest heart and lung centre, we attract some of the most talented consultants from all over the world. Below are some of the newest members of our team.



**Dr Emmanuel Ako**  
Consultant cardiologist  
Royal Brompton Hospital

Dr Emmanuel Ako has special expertise in general medicine and cardiology, with subspecialty expertise in coronary intervention. He is a

specialist in assessing patients with chest pain, breathlessness, palpitations, hypertension, valvular heart disease, dizziness, faints and ankle swelling.

In addition, he is an expert in the management of coronary artery disease and cardiovascular complications in haemoglobinopathies such as Thalassemia and Sickle Cell Disease. He performs coronary angiography, coronary physiology measurements and coronary angioplasty.



**Dr Jonathan Hill**  
Consultant cardiologist  
Royal Brompton Hospital

Dr Jonathan Hill is a consultant cardiologist with a clinical expertise in interventional cardiology, cardiovascular risk

assessment and cardiac CT. He has a special interest in acute myocardial infarction and new biological therapy.

Dr Hill's research programme is related to stem and progenitor cells in cardiovascular disease and he is the Clinical Senior Lecturer and Consultant Cardiologist at King's College London.

**Dr Carles Bautista**

Congenital interventional cardiologist  
Royal Brompton Hospital, Harefield Hospital, 77 Wimpole Street

Dr Carles Bautista works as part of a team to provide care for children and adults with congenital or acquired heart disease. His main research interests and area of expertise lie in minimally invasive interventional procedures, neonatal cardiology – including premature and neonatal intervention, and heart monitoring using internet-connected devices.



**Dr Mumin Noor**  
Consultant cardiologist  
Harefield Hospital

Dr Mumin Noor is a consultant cardiologist with an expertise in general cardiology, including angina,

syncope, palpitations and hypertension. He has specialist expertise in the diagnosis and treatment of heart failure, pacemakers and defibrillator implantation and cardiac resynchronisation therapy.

Dr Noor is currently involved in clinical research for cardiac device therapy in heart failure patients.

## MORE RESEARCH FUNDING INTO KEYHOLE SURGERY FOR ATRIAL FIBRILLATION



## Research update

### A STEP CLOSER TO PERSONALISED MEDICINE FOR SEVERE ASTHMA

An international study looking at personalised medicine for patients with severe asthma has been awarded £2.3 million from the Medical Research Council.

The PRISM study (Precision Intervention in Severe asthma) aims to introduce personalised medicine to ensure the right medications are prescribed to the right patients.

The PRISM study aims to better characterise the type of asthma in each individual by using their unique makeup of genes and proteins, to develop biomarkers that are more accurate than the blood eosinophil count, in predicting good response to biologic treatments.

For those patients for whom current treatments do not work, the researchers hope new, more effective treatments will be developed from a better understanding of what is making their asthma severe.

Professor Fan Chung, a respiratory consultant at Royal Brompton & Harefield NHS Foundation Trust and professor of respiratory medicine at Imperial College London, is leading the study.

He said: *"The PRISM project will bring hope for patients suffering from severe asthma by improving the doctor's diagnosis of the type of severe asthma they are suffering from. This will ultimately lead to better treatments at a personalised level for every patient suffering from this often very disabling condition."*

### TRUST CO-FUNDS 10 RESPIRATORY PROJECTS

Research looking into Chronic Obstructive Pulmonary Disease (COPD), asthma and idiopathic pulmonary fibrosis (IPF) are just some of the projects that have been awarded funding via a joint funding call from Royal Brompton & Harefield NHS Foundation Trust, Imperial College London and Imperial College Healthcare NHS Trust (ICHT).

Funding for the Biomedical Research Centre is for 5 years (2017-2022) and aims to support first-time trials of new discoveries, treatments and technologies in patients, to improve healthcare.

The Trust is well-positioned as a world-leading hospital for respiratory diseases, with a unique

population of patients and many internationally recognised clinicians. Imperial College and ICHT will be applying for BRC status for 2022-2027 and the Trust will collaborate with them to develop a strong respiratory theme.

10 projects were selected to receive up to £25,000 in funding, all of which demonstrated clear objectives that aligned with the key priority areas for respiratory disease.

Some examples of the projects which will be funded by this are: 'Telomere length and Idiopathic pulmonary fibrosis,' led by Dr Deborah Morris-Rosendahl; 'How exposure in infants affects respiratory health in adulthood,' led by Dr James Allinson; and 'Wheeze in Children,' led by Dr James Harker.

A research project comparing two types of surgical techniques for patients with long-standing persistent atrial fibrillation (LSPAF) has been awarded further funding to determine the long-term effects in patients.

The project, led by Dr Tom Wong, a cardiologist at Royal Brompton & Harefield NHS Foundation Trust, has been funded by the National Institute for Health Research and will compare catheter ablation to thoracoscopic surgical ablation for the treatment of LSPAF.

The longer a person has atrial fibrillation, the more difficult it is to go back to a normal heart rhythm. Those who have continuous atrial fibrillation for longer than a year are described as having LSPAF. With the additional funding, Dr Wong's team will monitor patients from the original research study who already have a small device implanted under the skin to measure their heartbeat.

This additional data will allow the research team to determine conclusively if thoracoscopic surgical ablation is better for patients with LSPAF compared with catheter ablation in the long term.

### INTERNATIONAL RECOGNITION FOR HAREFIELD RESEARCH TEAM

It has been a period of successes for the respiratory research group at Harefield Hospital, who have been recognised both nationally and internationally, for their work on pulmonary rehabilitation and chronic obstructive pulmonary disease.

One project, led by Jessica Walsh, working with Dr William Man, was awarded 'Best Abstract' under the category of rehabilitation and chronic care at the European Respiratory Society conference.

The conference showcases the best of respiratory medicine research.

Dr Man's extensive work on pulmonary rehabilitation has also been recognised with his appointment as co-chair for the British Thoracic Society Pulmonary Rehabilitation Guidelines Development group, which will review the latest scientific evidence over the next 18 months in order to produce clinical practice recommendations.

*"The British Thoracic Society guidelines are very well respected and widely read across the world. I am delighted to be able to contribute to these guidelines which should be a valuable resource for those providing pulmonary rehabilitation in the UK and beyond,"* Dr Man said.

# Beating heart bypass for a high-risk patient

Consultant cardiac surgeon Mr Shahzad Raja is internationally renowned for his expertise in performing coronary artery bypass surgery whilst a patient's heart is still beating. This complex technique requires great precision and skill to get right but can significantly improve outcomes for high-risk patients.

Kiran on holiday with his wife, Shilpa, after his surgery.

## TACKLING CLOGGED CORONARY ARTERIES

Coronary heart disease is a leading cause of death worldwide and occurs when the blood flow through coronary arteries becomes interrupted or blocked due to atherosclerosis. Depending on the extent of the blockage, different interventional and surgical options can be explored.

If the plaque is limited in size, non-surgical coronary angioplasty with a balloon and/or stents may be used to widen the narrowed sections of the artery. However, if the plaque is more extensive and/or affects multiple vessels, a coronary artery bypass grafting (CABG) procedure may be needed for revascularisation.

CABG surgery utilising a cardiopulmonary bypass machine which takes over the functions of the heart and lungs (termed 'on-pump CABG') is widely regarded as the gold standard surgical approach. It enables the heart to be stopped for the surgery to be completed with greater ease. However, cardiopulmonary bypass machines can result in a systemic inflammatory response, leading to multiple organ dysfunction and morbidity. The risk of complications may be heightened in some patient communities such as those that are older, have renal dysfunction or diabetes.

## A SAFER APPROACH TO BYPASS SURGERY

'Off-pump CABG' is an alternative approach which enables the heart to continue beating whilst the surgery is performed. The technique was revived over two decades ago and involves the use of a tissue stabiliser to press down around the affected coronary artery to steady the heart, temporarily occlude blood flow and stitch a graft beyond the narrowing – ideally an internal mammary artery.

Although the heart remains perfused by its collateral circulation, the procedure must be performed quickly and requires the skill of an experienced surgeon with exclusive off-pump

practice in a high volume off-pump coronary surgery centre for the best results. A recent 20-year investigation of over 10,000 patients at Harefield Hospital, which is one such centre, compared the outcomes of on-pump and off-pump CABG surgery. The study demonstrated that off-pump CABG was associated with a lower risk of operative mortality, fewer postoperative complications and similar 20-year survival and freedom from reintervention when compared to on-pump CABG. This was the longest study of its kind.

## SUCCESSFUL TRIPLE BYPASS FOR HIGH-RISK PATIENT

At 57, Kiran had already achieved a great deal in his life. He successfully started and expanded a group of elderly nursing and care homes to 13 sites across the UK, had his first grandchild, and most recently attended the wedding of his youngest daughter. He led a very active lifestyle, regularly travelling for work, as well as swimming 2-3 times a week and going for long countryside walks.

However, he noticed a persistent pain in his shoulder whilst on his walks, particularly when going uphill. He decided to see a doctor about it, but repeat ECG tests came back negative, despite the pain continuing. After struggles booking in an appointment with pain management and further heart exams, he decided to seek private care with Royal Brompton & Harefield Hospitals Specialist Care.

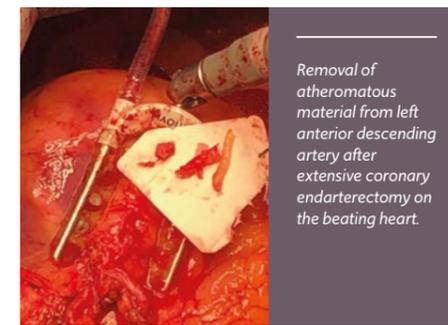
"All the tests were done really quickly at Harefield and I met several great cardiologists. They told me that my angiogram showed that three of my coronary arteries were

blocked and couldn't be stented – that I'd need a triple heart bypass," explains Kiran. "I was absolutely shocked as I was at my daughter's wedding a few weeks before and was jumping up and down all night. I had no idea there was something wrong with me like this.

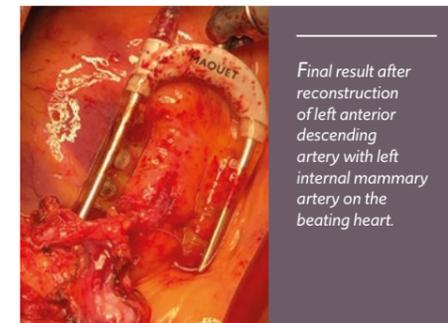
"I was scared of surgery initially, but when I met Mr Raja who was recommended to operate on me, my heart just said this was the right man for the job – he was just such a positive man to speak to. He encouraged me to do research on him, but I didn't have to, I just asked him to go ahead.

Mr Raja says: "Kiran's case was quite complex, as he had diabetes and multi-vessel coronary artery disease. We recommended an off-pump bypass procedure to ensure the best results as he was a very high-risk patient. We were very pleased with the outcome and would recommend the off-pump procedure to all high-risk patients in centres that have the expertise to perform it".

*"When I woke up from the surgery, I saw Mr Raja, who came to check up on me. I couldn't talk to him at that point, but I just put two hands up to thank him for giving me a new life. And after about 6 weeks I was back to normal really – I was driving again and going on my long walks which I love."*



Removal of atheromatous material from left anterior descending artery after extensive coronary endarterectomy on the beating heart.



Final result after reconstruction of left anterior descending artery with left internal mammary artery on the beating heart.



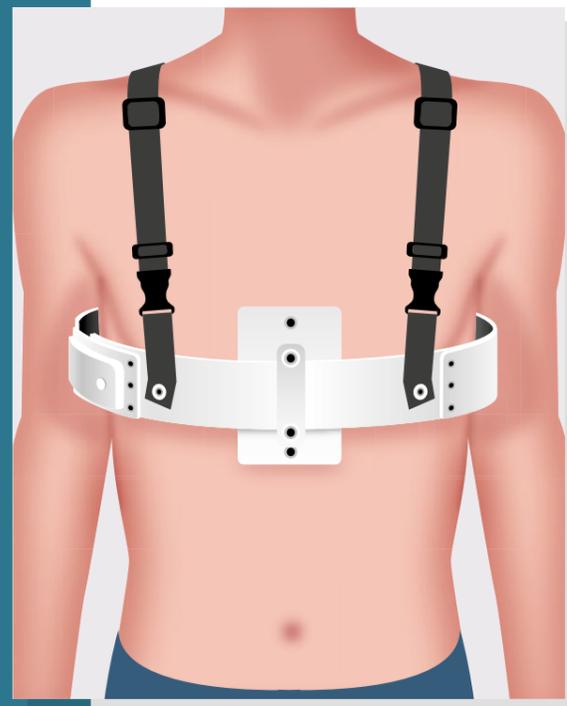
**Mr Shahzad Raja**  
Consultant cardiac surgeon

Mr Raja specialises in cardiac surgery, including coronary artery bypass, revascularisation, and valve replacements.

To find out more about our off-pump CABG surgical procedures, or to refer a patient, please contact the customer services team on **+44 (0)20 3131 0535** or email [privatepatients@rbht.nhs.uk](mailto:privatepatients@rbht.nhs.uk)

# BOOSTING BODY CONFIDENCE ONE CHEST AT A TIME

Chest deformities are a relatively rare problem for young teens but can greatly affect their self-esteem and might lead to difficulties in the functioning of their heart and lungs. Fortunately, minimally invasive techniques are available at Royal Brompton & Harefield Hospitals Specialist Care that can safely return chests to a normal shape.



The pectus carinatum brace applies pressure to the breastbone to move it back to a normal position.

## KNOCKING BODY CONFIDENCE

The two most common chest deformities are pectus excavatum ('funnel chest') and pectus carinatum ('pigeon chest'). They occur when the breastbone sinks in (pectus excavatum) or protrudes out (pectus carinatum) of the chest. It is not known exactly how these conditions occur, but it is thought to be due to the cartilage in the ribcage overgrowing.

These conditions may not be obvious in childhood and present themselves mostly during the growth spurts of adolescence. They occur more often in boys than girls and are relatively rare disorders affecting about 1 in every 1,000 children for pectus excavatum and 1 in 1,500 for pectus carinatum. As these conditions appear to run in families, there may be a genetic link.

As the ribcage is more rigid than normal for both conditions, they can result in difficulty breathing, chest pain and an irregular heartbeat – particularly on physical exertion. However, the main impact is psychological. Due to the chest's appearance, the conditions can cause significant embarrassment for children, resulting in low self-esteem and clinical depression. They often exclude themselves from social and sporting activities, particularly those that require them to expose their chests, such as swimming.

## CORRECTING DEFORMITIES WITH MINIMALLY INVASIVE TECHNIQUES

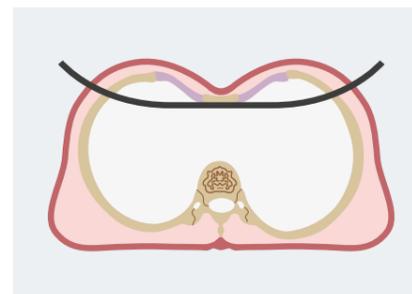
Past procedures to correct chest deformities were very invasive and involved surgically removing the deformed cartilage around the breast bone and fixing it into a normal position using metal and mesh supports. Fortunately, less invasive techniques are now available.

Pectus carinatum can be treated with a chest brace which applies pressure to the front and back of the ribs to gradually move the breastbone back to where it should be. The patient wears the brace for anything between a couple of months up to a few years depending on a few variables and the severity of the deformity. Ideally, the brace should be worn as many hours a day as possible, but it could be removed for showering or sporting activities.

Pectus excavatum can be treated with the minimally invasive Nuss surgical procedure.

Small incisions are made either side of the chest and one to three curved metal bars are placed behind the breastbone to push it into a normal position. The bars are kept in place for one to three years before removing – after which time the ribs stay in their new shape.

"The Nuss procedure is very quick, taking around 45 minutes, and the patient can leave hospital within two to three days. Due to the positioning of the bars, the patient will need to reduce their physical activities until they are removed and there is pain experienced to start. However, we have an excellent pain management team to support them and the visual results are pretty instant," explains Mr Nizar Asadi, consultant thoracic surgeon at RB&HH Specialist Care.



The Nuss procedure for pectus excavatum. Metal bars are inserted through incisions on either side of the chest and flipped up to lift the breastbone to a normal position.



## HELPING A YOUNG MAN BE MORE ACTIVE

At the age of 22, Andrew had been living with pectus excavatum for years. He led a very active lifestyle growing up, earning a black belt in martial arts, as well as regularly cycling and rowing. However, he always felt his chest was limiting his sporting abilities.

He explains: *"It wasn't so much the cosmetic side that bothered me, but I feared that if someone hit me particularly hard in the chest with my ribs that close to my heart, it might do some serious damage. Also, with the shape of my chest, my lungs didn't have anywhere to go – it felt quite uncomfortable every time I exerted myself. So, I felt I had to do something about it."*

Mr Asadi says: "We performed the surgery on Andrew over a year ago and were very pleased with his results. However, as he hasn't been able to take part in the sporting activities he loves, he is understandably very keen to have the bars removed – which we intend to do very soon.

*"Andrew received the surgery through the NHS, but unfortunately it is no longer funded due to being considered cosmetic in nature. However, we know these conditions can cause considerable distress to those affected and encourage GPs to refer patients who would like to explore these treatments privately to help improve their body confidence."*



*Although these procedures can be performed at any age, the best results are achieved in patients at the start of puberty up to 16 years of age, whilst the bones are not yet fully set.*

Mr Nizar Asadi

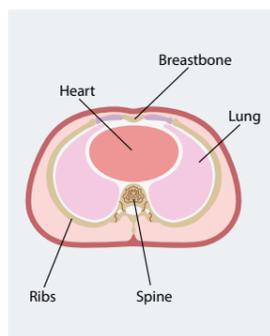


**Mr Nizar Asadi**  
Consultant thoracic surgeon

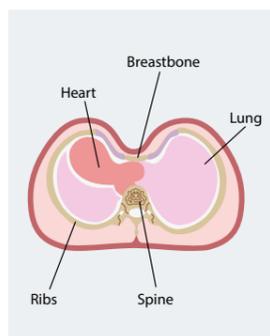
Mr Asadi specialises in minimally invasive thoracic surgery.

To find out more about our minimally invasive chest deformity treatments, or to refer a patient, please contact the customer services team on **+44 (0)20 3131 0535** or email [privatepatients@rbht.nhs.uk](mailto:privatepatients@rbht.nhs.uk)

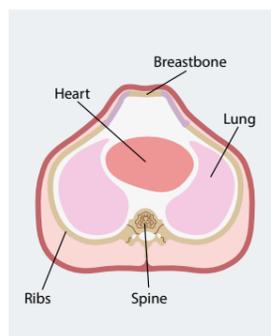
Normal



Pectus excavatum



Pectus carinatum



# SHOCKWAVE IVL

## Revolutionary technology to treat calcification

A ground-breaking new technology is now available at Royal Brompton & Harefield Hospitals Specialist Care, which can fracture problematic calcium in the walls of coronary arteries, enabling optimal stent expansion and improved blood flow to the heart.

Coronary artery calcification (CAC) can result in increased stiffness, preventing arteries from dilating to their full capacity and so reducing oxygen supply to the heart. Left untreated, this can greatly increase the risk of future adverse cardiovascular events.

CAC is age and gender-dependent, with 10-15% of patients with significant coronary stenosis having enough calcium to prevent optimal plaque dilatation and stent expansion. Diabetes mellitus, chronic kidney disease and a high BMI may also increase the risk of calcification.

### CALCIFICATION PREVENTS EXISTING CORONARY INTERVENTIONS FROM WORKING

There is a range of percutaneous coronary interventions (PCI) available to widen narrowed arteries and enable the placement of stents to improve blood flow. However, calcification can limit the success of existing procedures.

For example, the force applied by balloon angioplasty to vessel walls may not be sufficient to fracture calcium and enable a stent to be fully expanded – reducing its success in preventing restenosis. The calcification may also increase the risk of vessel dissection and acute vessel closure.

Other PCI techniques – orbital and rotational atherectomy – are available to specifically remove CAC. They scrape away hard, superficial calcified tissues in coronary arteries whilst sparing softer elastic tissues, to increase blood vessel compliance for a stent to be fully expanded. However, the techniques create fragments which can induce slow blood flow, cause an embolism further downstream and result in peri-procedural myocardial infarction.



**Dr Jonathan Hill**  
Consultant cardiologist

Dr Hill specialises in interventional cardiology, cardiovascular risk assessment and cardiac CT.



**Professor Carlo Di Mario**  
Consultant cardiologist,  
Professor of cardiology

Professor Di Mario specialises in coronary and structural (valvular) interventional cardiology.

### AN INNOVATIVE SOLUTION USING AN OLD TECHNOLOGY

With existing PCI techniques limited in their ability to safely and successfully dilate calcified coronary arteries, an entrepreneurial team of three came together to develop an innovative device to tackle calcification with a technology that has long existed.

In 2007, Daniel Hawkins, a businessman, and John Adams, an electrical engineer (who worked on early pacemakers), were working at a medical incubator to service unmet medical needs with new technology. It is here they discovered the application of lithotripsy in tackling problematic calcium in the cardiovascular system.

Lithotripsy has been used for over 30 years in medicine to safely fragment kidney and gallbladder stones, facilitating their excretion without harming soft tissues. An electrical current is used to generate a spark which vapourises fluid to produce powerful pressure waves that travel safely through the body's soft tissues at the speed of sound, breaking up denser kidney stones.

Teaming up with Stanford University cardiologist and bioengineer, Professor Todd Brinton, they experimented with a new lithotripsy device they developed to tackle CAC. They discovered their device could crack calcium-rich egg shells whilst leaving their membranes intact – which is much like the endothelium of a blood vessel. They therefore had a proof-of-concept for cardiovascular applications.

Fast-forwarding to today and after several successful international clinical trials, Shockwave Intravascular Lithotripsy (IVL) is now available as a PCI to safely and successfully treat patients with moderate-to-severe CAC.

### SHOCKWAVE IVL

The device is composed of a fine 0.014-inch guide wire with an array of lithotripsy emitters enclosed in an integrated balloon. This enables clinicians to use the same minimally-invasive technique as balloon angioplasty to get directly to the site of calcified lesions and transmit the sonic pressure waves to the blood vessel wall, to fracture calcium.

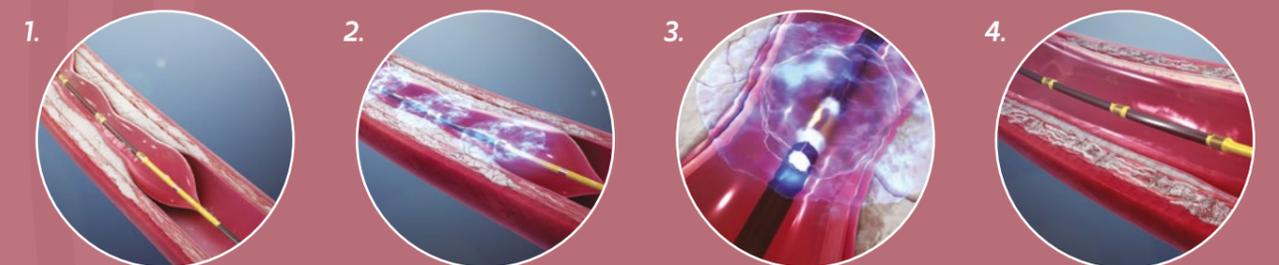
*"The technology enables the coronary artery to become much more compliant before dilation – much more than is possible with other methods. This allows us to fully expand a stent, to successfully increase blood flow to the heart,"* explains Professor Carlo Di Mario, consultant cardiologist and professor of cardiology.

Professor Di Mario was the Co-Principle Investigator of the Disrupt CAD I and II study trialling the new Shockwave IVL technology on 160 patients. As such, Royal Brompton Hospital was the first in Europe to conduct coronary IVL in 2015 and Professor Di Mario treated most patients during both studies. Dr Jonathan Hill, also a consultant cardiologist, is now following his steps, becoming Co-Principle Investigator of the Disrupt CAD III trial, a larger US and European lithotripsy study which has already completed recruitment of its patients.

"The results of these studies demonstrated that the procedure is safe and effective for patients with moderate-to-severe calcification. Also, it has quick recovery times, with the patient able to go home the following day. It really is a game-changer in the treatment of narrowed coronary arteries," says Professor Di Mario.

*"I recommend any patient with angina or silent ischaemia, and moderate-to-severe CAC, be referred for treatment with Shockwave IVL."*

### HOW SHOCKWAVE INTRAVASCULAR LITHOTRIPSY WORKS



1. The IVL catheter is delivered across a calcified lesion over an 0.014" wire and the integrated balloon is expanded to 4 atm to facilitate efficient energy transfer.

2. An electrical discharge from the emitters vaporises the fluid within the balloon, creating a rapidly expanding and collapsing bubble that generates sonic pressure waves.

3. The waves create a localised field effect that travels through soft vascular tissue, selectively cracking intimal and medial calcium within the vessel wall.

4. After calcium modification, the integrated balloon may subsequently be used to dilate the lesion at low pressure in order to maximise luminal gain.

Adapted with permission from Shockwave Medical Inc.

To find out more, or to refer a patient to assess their suitability for Shockwave IVL, please contact the customer services team on **+44 (0)20 3131 0535** or email [privatepatients@rbht.nhs.uk](mailto:privatepatients@rbht.nhs.uk)

# LUNG CANCER DIAGNOSTIC BREAKTHROUGH FOR HIGH-RISK PATIENTS



An innovative, safe and minimally invasive lung cancer diagnostic tool is now available at Royal Brompton & Harefield Hospitals Specialist Care, and offers new hope to patients at high-risk of complications associated with the current gold standard.

## EARLY LUNG CANCER DIAGNOSIS POSES A DIFFICULT CHALLENGE

Lung cancer is the most commonly diagnosed of all types, with over 470,000 new cases reported in Europe in 2018. However, due to the delay in symptoms appearing, it is often diagnosed at an advanced stage, resulting in a poor prognosis – the 5-year survival rate is currently 9% and caused an estimated 1.8 million deaths worldwide in 2018.

Chest CT screening has offered a promising improvement in lung cancer prognosis, with data indicating a 20% reduction in lung cancer mortality. However, almost a third of patients undergoing screening have at least one pulmonary nodule which requires further diagnostic assessment.

## A SAFER APPROACH

The current gold standard for investigating pulmonary nodules is CT-guided percutaneous transthoracic pulmonary biopsy. This approach achieves high sample yields to assist with diagnostic accuracy but can lead to significant complications such as pneumothorax, particularly amongst emphysema patients.

Thankfully, a new minimally invasive bronchoscopic technique is now available which enables safe access to pulmonary nodules even when they are beyond the limits of the airways. The innovative Archimedes® Virtual Navigation System integrates CT, pattern recognition software and fused fluoroscopy to provide three-dimensional, real-time airway Guided Transbronchial Needle Aspiration (TBNA) and Bronchoscopic Trans-Parenchymal Nodule Access (BTPNA) to collect biopsy samples with accuracy.

The advanced technology enables blood vessels to be identified to ensure a safe, non-vascular path during both Guided TBNA and BTPNA procedures. In addition, the Archimedes system assists respiratory physicians to identify multiple targets, regardless of location in the lung, to enable multiple biopsies to be performed with minimal additional risk.

Results from a cohort of 25 patients demonstrated a high diagnostic yield of 85%, and there were no pneumothoraces reported despite over half the nodules sampled being within 1cm of the lung edge.

## EXCITING NEW POSSIBILITIES

*“This is a really exciting new technology. We see it offering a safe alternative to the traditional CT-guided transthoracic approach – particularly for high-risk patients such as those with emphysema. We are therefore very pleased to be the first UK centre to offer this service,”* says Dr Samuel Kemp, consultant respiratory physician at RB&HH Specialist Care. “It also has the potential to reduce waiting times for lung cancer biopsies, to hopefully improve outcomes for these patients.

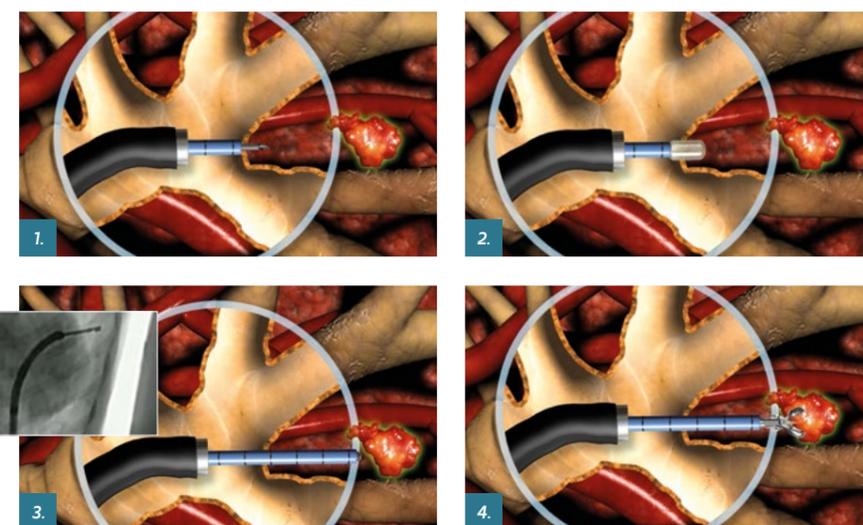
“Additionally, due to co-morbidities and older age, up to a third of patients with potentially curable lung cancer cannot undergo surgical resection. In future, we think this technology may go one step further and provide an opportunity to deliver local treatment to early lung cancers in these patient groups to offer a better chance of a cure.”



**Dr Samuel Kemp**  
Consultant respiratory physician

Dr Kemp specialises in treating a range of respiratory conditions, including lung cancer, COPD, emphysema and pleural disease.

## BRONCHOSCOPIC TRANS-PARENCHYMAL NODULE ACCESS (BTPNA) WITH ARCHIMEDES



The Archimedes system in action. After a non-vascular path to the pulmonary nodule has been mapped out by the advanced software, the Archimedes Sheath is advanced through the lung tissue via the airways to collect a biopsy sample.

To find out more about our minimally invasive lung cancer diagnostics, or to refer a patient, please contact the customer services team on **+44 (0)20 3131 0535** or email [privatepatients@rbht.nhs.uk](mailto:privatepatients@rbht.nhs.uk)

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## Our primary care managers are **here to support you**

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### Heart surgery through groin offers hope to patients in the UAE

At the 2020 Arab Health Exhibition, Dr Robert Smith presented a simulated surgical demonstration of MitraClip therapy to a live audience. The less-invasive procedure offers greater hope to older patients without the need for open-heart surgery.

Read more on



### Education at its best at Harefield Hospital

Dr William Man and Dr Samantha Kon delivered a lung health master skills workshop supported by the Hillingdon Integrated Respiratory team and Harefield Hospital Pulmonary Rehabilitation team.

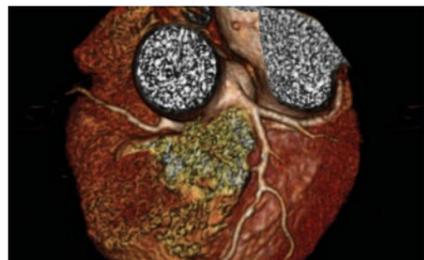
Read more on



### Royal Brompton & Harefield Hospitals partnership with Ain Shams University Hospital in Egypt

Royal Brompton & Harefield Hospital are partnering with Ain Shams University Hospital, in Egypt, to build upon their specialised cardiac services for Egyptian nationals, and carry out joint research.

Read more on



### Spotting coronary heart disease in the age of COVID-19

Patients with heart disease are known to have an increased risk of suffering from severe complications from COVID-19. Our consultant cardiologist, Dr Simon Davies, discusses what your patients should be aware of.

Read more on



### 36 years ago today – transplant makes British medical history

The first successful heart and lung transplant operation in Britain took place at Harefield Hospital. It took a team of 20 and more than five hours to carry out the operation, led by Professor Sir Magdi Yacoub.

Read more on



### Covid-19: Fighting for life

#### Inside a hospital ward fighting to save sickest patients

When ventilation is no longer enough to keep the sickest COVID-19 patients alive, there is still hope at Royal Brompton Hospital's adult intensive care unit's ECMO ward.

Read more on

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Educational events delivered by world-leading experts that:

- Contribute towards your CPD
- Can be delivered conveniently at your practice



News and updates relating to heart and lung care



Referrals across our centres:

- Harefield Hospital
- Royal Brompton Hospital
- 77 Wimpole Street



**Royal Brompton & Harefield Hospitals Specialist Care**

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