On Monday 22 August 2022, an 84-year-old patient underwent an exceptional operation at the Cardiovascular Department of Cliniques Saint-Luc: the replacement of a tricuspid valve by catheterisation. This is a world first for this minimally invasive interventional cardiology procedure. Carried out in collaboration with the firm TRICares, this operation constitutes a real hope for patients who are too fragile to undergo major surgery or who do not respond to conventional drug treatments.

The Heart and Tricuspid Valve

The heart is made up of four valves: pulmonary, aortic, mitral, and tricuspid. The tricuspid valve is made up of three leaflets and separates the right atrium and ventricle. Dysfunction of this valve can lead to heart failure. Unfortunately, current management remains limited: particularly invasive surgery or drug treatments with fluctuating results. Fragile patients who do not respond to medication are therefore left without therapeutic options.

The Procedure

On 22 August this year, an 84-year-old patient underwent transcatheter replacement of her tricuspid valve. “The catheterisation allowed us to insert a probe carrying the new valve into the femoral vein in the patient’s groin,” explains Prof. Joëlle Kefer. The manipulation of the probe allows it to reach the heart at the exact site of the tricuspid valve insertion, following the natural path of the veins: a non-surgical treatment that required training, equipment, and techniques that were very different from but complementary to cardiac surgery.

Special Features of the Valve

Another special feature is that the valve is a stent made of nitinol (an alloy of nickel and titanium) which contains three leaflets of porcine pericardium that open and close with each heartbeat. Moreover, its diameter is very large (45 to 50 mm) compared to that of a conventional coronary stent (3 mm); it therefore had to be crushed at the time of crimping on the carrier catheter in order to reduce its diameter, and then it naturally resumed its shape once released from the constraint of the catheter. “In all, the procedure time (from valve insertion into the groin to probe removal from the patient) was only 20 minutes,” says Prof. Kefer. All this was done without opening the chest and heart, and without extracorporeal circulation.

Procedure Suitability and Multidisciplinary Team

The procedure was particularly suitable for this patient who would not have been able to tolerate surgery. This required the work of a multidisciplinary team: anaesthetists, echocardiographers, and interventional cardiologists, namely Prof. Joëlle Kefer and Prof. Christophe Beauloye with ultrasound guidance from Prof. Jean-Louis Vanoverschelde and Prof. Agnès Pasquet.

The Valve Implantation Device

Named Topaz, the biological tricuspid valve device to be implanted was developed in collaboration with the firm TRICares after several “compassionate” cases (in patients at the end of life in intensive care) in France and Germany.

Results and Recovery

Today, the patient is doing well and continues her convalescence at home after less than a week in hospital. Benefits on her quality of life are already observable: improved breathing, less water in the lungs, less swelling in the legs, increased energy, etc. “She suffered no complications and was able to walk again,” enthuses Prof. Kefer. Another positive sign is that her general clinical condition has returned to normal… to the point of stopping all antidiuretic drugs. This is indisputable proof that the valve is working perfectly, since all tricuspid leakage has been stopped.

Future Interventions and Expansion

Further interventions are already planned with around twenty patients in the screening phase. The only problem is that the prospective patients must have anatomical criteria compatible with the valve, which is currently available in only one size. A second size is expected to be developed in the near future in order to expand the range of treatments. Although early intervention is always preferable to increase the chances of reverse remodelling of a dilated heart.

A Promising Future for Valve Repair

In fine, this procedure completes the therapeutic arsenal for valve repair. It also brings a message of hope for patients who are too fragile for major surgery or who do not respond to conventional drug treatments. This is all the more promising as more than 12 million people in Europe alone suffer from valve disease. Just as percutaneous aortic valve implantation (TAVI) has become a routine procedure for people over 75 years of age, transcatheter tricuspid valve replacement now offers the prospect of reduced post-operative morbidity, improved quality of life, and longer life expectancy. A future first-line treatment that Prof. Kefer is calling for!

INSTITUT CARDIOVASCULAIRE
Cliniques universitaires SAINT-LUC
UCLouvain - BRUXELLES