Emergency transseptal transcatheter mitral valve-in-valve implantation

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• 42 year old female from French Polynesia
• Mitral valve replacement 5 times following rheumatic heart disease
• Last operation 10 years earlier (2002), with the implantation of a 31 mm Carpentier-Edwards bioprosthesis
• Referred for recurrent pulmonary oedema due to bioprosthesis dysfunction with severe stenosis (mean gradient 23 mmHg, area 0.5 cm²)
• Patient declined for a new surgical MVR by the team who performed the last intervention due to:
  – Extremely poor post-operative course following the last surgery ("never again")
  – Prohibitive risk for a new operation (multiple redo)
  – EuroSCORE 11%, STS 3%

• Assessment by our heart team:
  – Patient deemed **unsuitable** for a surgical valve replacement
  – Planned transapical mitral valve-in-valve implantation with a **29 mm** Sapien XT valve based on CT and TEE measurements
• During screening, acute heart failure due to rapid atrial fibrillation leading to shock, multiple organ failure and DIC
• Logistic EuroSCORE 55%, STS 71%
• Deemed as a poor candidate for a transapical approach
• Decision to attempt emergency percutaneous mitral valve-in-valve implantation through a transseptal approach with a 26 mm Sapien XT valve (29 mm unavailable on a NovaFlex delivery catheter)

• On arrival in the cath lab, cardiac arrest following ventricular fibrillation → CPR & defibrillation
• Placement of veno-arterial ECMO (left fem. artery & vein)
• TEE guidance
• Right femoral vein
• Transseptal puncture
• Balloon dilatation of the atrial septum with 12 & 14 mm balloons

• Crossing of the mitral prosthesis
• Lunderquist extra-stiff 0.035” wire in the left ventricle
• Pre-dilatation of the mitral prosthesis with an 18 mm balloon

• **Failure to cross** the atrial septum with the 26 mm Edwards Sapien XT valve
• Valve difficultly retrieved with pliers, causing laceration of the right femoral vein, with bleeding around the new eSheath, requiring continuous compression
• Balloon dilatation of the atrial septum with a 18 mm balloon

• Implantation of a 26 mm Sapien XT valve in the mitral bioprosthesis (without rapid pacing)
• TEE shows severe transvalvular and mild paravalvular regurgitation
• Decision to implant a second valve-in-valve (with an extra ml of contrast medium)
• However, during the preparation of the second valve, migration of the first valve in the left atrium

• Implantation of a second 26 mm Sapien XT valve
Final result

- Good final result of the “second” valve (mean gradient 3 mmHg, grade I regurgitation)
- “First” valve moving freely in the left atrium
Post-procedure course

- Acute kidney injury requiring temporary renal replacement therapy
- Gram-negative bacteremia and sepsis
- **Heparin induced thrombocytopenia**, requiring treatment of UFH to be switched to danaparoid, changed to argatroban due to recurrence of HIT
- Overall, **favourable evolution** during the 2 weeks following the procedure, with weaning from mechanical ventilation, ECMO and inotropes
- However, on the 14th day after the procedure, **abrupt recurrence of heart failure**

- **Entrapment** of the mobile valve in the implanted valve in a **reverse position**, impeding blood flow (transvalvular mean gradient 20 mmHg)
• New emergency procedure to dislodge the entrapped valve
• Favourable clinical evolution
• Decision to perform bailout surgery to remove the “pinball valve” from the left atrium through a thoracotomy (CPB with bivalirudin)
• However, the day before the planned operation...
Outcome

• Uneventful hospital course during the following 2 weeks
• Transthoracic echocardiogram:
  – Persistence of the valve in the LAA
  – Transmitral mean gradient 9 mmHg
  – Grade II mitral regurgitation
• Discharged 45 days after the index procedure
• Returned to Tahiti
• Good functional capacity (NYHA 2)
• Sudden death at 6 months, no autopsy
Conclusions

• Transseptal transcatheter mitral valve-in-valve implantation is feasible

• It is possible to perform this procedure in an emergency setting with ECMO

• Valve migration in the left atrium is a possible complication, which may lead to late entrapment in a reverse position, with dramatic hemodynamic consequences