Anesthesia Management for Transapical Transcather Valve implantation
‘Hybrid surgical techniques’
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The main anesthesia challenges of the procedure are as follows is Preparation for emergency CPB
- Cardiac surgeon & perfusionists
- femoral venous and arterial access
- Heparin (100 IU/kg) was given to achieve an activated coagulation time 200 seconds

Avoidance of passive hypothermia
- an external convective warming
- system with an underbody blanket
- an intravenous fluid heater system used to preserve a core temperature of 36°C.

Maintain volume status
- maintain the central venous pressure (CVP) above 10 cmH2O by volume substitution with crystalloids or colloids.
- the volume status and left ventricular function were monitored by TEE in the transgastric short-axis view, and the ejection fraction was calculated from measurements in the midesophageal 4-chamber view in the pre- and postsurgical TEE evaluation.
- During the entire procedure, the mean arterial pressure (MAP) was maintained above 65 mmHg. Intraoperative hypotension (MAP 65 mmHg) was treated with intravenous crystalloid and/or colloid

Inotropic agents
- infusion and boluses of inotropic agents. Based on the findings of the left ventricular function on the TEE
- norepinephrine boluses in patients with no regional wall motion abnormalities (RWMAs).
- In patients with any RWMAs or impaired left ventricular function (ejection fraction 45%) epinephrine boluses were used to increase the MAP 65 mmHg.
- Continuous infusion of inotropic agents was started whenever more than 4 boluses of inotropes were required to maintain the MAP to 75 mmHg after the apex puncturing of the heart in order to prevent hemodynamic deterioration after cessation of RVP. To achieve this MAP, boluses of inotropes were given, or, in case of a continuous infusion, the rate was increased RVP

Indication of rapid pacing
- the rapid pacing was started by the anesthesiologist with a frequency of 180 beats/min. Only when reliable capture was associated with a marked reduction in blood pressure was the balloon inflated.
- A reduction of systolic arterial pressure to below 60 mmHg was considered adequate. RVP was terminated when the balloon was adequately deflated.
- The MAP was stabilized post-RVP with bolus doses of epinephrine in 5-g steps; if the patient lost the sinus rhythm post-RVP, then the external pacemaker was used to achieve a stable ventricular rhythm.
- CPB was started if more than 10 bolus doses of epinephrine were necessary without an increase in the MAP or with persistent ventricular fibrillation
**TEE monitoring**

- presurgical TEE evaluation was performed after induction of anesthesia in the operating room by the anesthesiologist.
- The entire TA-AVI procedure was monitored by TEE using the midesophageal long-axis view and the midesophageal short-axis view to assess valve position and function. In addition to standard measurements, determination of the aortic annulus diameter was essential for valve size selection.
- The aortic annulus diameter was measured repeatedly (3-5) using the midesophageal long-axis view in midsystole to evaluate correct valve sizing.
- The measurements were performed from the hinge point of the left or noncoronary cusp to the hinge point of the right coronary cusp, including aortic valve cusp calcification. Accurate measurement of the aortic annulus was vital. Based on the presurgical TEE measurements of the diameter of the aortic annulus, the size of the prosthesis was chosen. In order to achieve stable and safe positioning with low risk of paravalvular leakage, an oversizing technique of approximately 2 to 3 mm is used.

**Postoperative course and analgesia**

- Postimplantation, the MAP was maintained above 65 mmHg; patients with stable postoperative hemodynamics were transferred to the postanesthetic care unit (PACU). If a patient required more than 3 g/kg/min of norepinephrine or epinephrine, they were transferred to the intensive care unit (ICU).
- In all patients, early extubation was attempted. For early postoperative analgesia, 1 g of acetaminophen was administered.
- Systemically before skin closure; in addition, local infiltration of the intercostal space was performed using 20 mL of ropivacaine (2 mg/mL). Further postoperative analgesia consisted of a bolus of piritramide (0.1 mg/kg) as required and acetaminophen (1 g every 6 hours) to achieve a pain score between 2 to 4 on an analog pain scale from 0 to 10.