

## A New Apheresis Device for Antithrombotic Drug Removal during Off-Pump Coronary Artery Bypass Surgery

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*This case reports on an a 74-year-old male patient who was admitted to Artemed Klinikum Munich South, for urgent coronary artery bypass grafting (CABG) for severe three-vessel disease (occluded right coronary artery, severe stenosis of the left descending artery, and severe stenosis of the circumflex artery).*

### Case presentation

- The patient was treated with Dual Antiplatelet Therapy (DAPT) (ticagrelor 2×90 mg/day plus aspirin 100 mg/day) for the acute coronary syndrome and non-ST elevated myocardial infarction (NSTEMI) after an acute occlusion of the right coronary artery
- Additional medical history included hypothyroidism, moderate diverticulitis, hypercholesterolemia, and hypertension
- In addition to DAPT, the patient was treated with rosuvastatin, bisoprolol and L-thyroxin
- Ticagrelor was stopped the day before surgery
- After the initiation of standard anesthetic care, tubes were connected to a 12 F, 3-lumen high-flow catheter, which was implanted into the right cervical vein of the patient. This enabled treatment with the CytoSorb intended to remove residual ticagrelor throughout the operation
- The off-pump coronary artery bypass (OPCAB) procedure included harvesting the left internal thoracic artery (LITA), myocardial revascularization using an Octopus tissue stabilizer with the LITA to the left anterior descending artery and venous grafts to the circumflex artery and to the right coronary artery. The procedure was then finished using standard techniques while the graft showed good flow rates

### Treatment

- Adsorption was initiated with the skin incision and was continued for 221 min
- CytoSorb was run in conjunction with a new apheresis platform, PUR-01 (Nikkisio Co., Ltd., Tokyo, Japan)
- Blood flow rate: 150-200 ml/min. The blood volume that had circulated through the CytoSorb during the 221 min treatment phase was 39.04 L
- Anticoagulation: with start, 5000 I.E. single injection of heparin. Prior to the bypass anastomosis, another 10,000 units of heparin were administered (activated coagulation time > 300 s)

### Measurements

- Hemodynamics and norepinephrine requirements
- Chest drain volume
- Hemoglobin
- Creatine kinase levels

### Results

- Mid-range doses of norepinephrine could be reduced and finally stopped by the end of the first postoperative day
- The chest tubes delivered 440 mL in 24 h
- Hemoglobin (Hb) dropped from 13.1 g/dL preoperatively to 9.3 g/dL postoperatively so that perioperatively, 2 units of red blood cells were infused
- Postoperatively, the maximum creatine kinase level was 232 U/L (normal range, < 190 U/L), and the creatine kinase MB (CKMB) isoenzyme was 6.5 µg/L (normal range, < 5.2 µg/L)

### Patient Follow-up

- Postop the patient was transferred to the intensive care unit and was extubated the same day
- Chest tubes were removed on the second postoperative day
- On discharge, the Hb was 12.4 g/dL
- The further postoperative course was uneventful, with good recovery of the patient
- At the 6 weeks follow-up, the patient demonstrated a normal left ventricular function and sinus rhythm, with no cardiac symptoms

### Conclusion

- This is the first report on the intraoperative use of a PUR-01 apheresis pump in combination with a CytoSorb adsorption column to remove ticagrelor during an OPCAB procedure
- The treatment resulted in good control of the peri- and postoperative bleeding risk and hemodynamic stabilization, with a concomitant reduction in norepinephrine requirements as well as an overall satisfactory clinical outcome
- This is the first publication showing that the setup is feasible and safe with no device-related adverse events occurring

**Note from CytoSorbents: The setting to use CytoSorb for ticagrelor removal outside cardiopulmonary bypass, however, is not covered in the current Instructions for Use.**