HOT TOPICS 08

GIOVEDI' 16 GIUGNO

SALA MAGENTA B - SESSIONE PARALLELA

12.30-13.00

TECNOLOGIA ED INNOVAZIONE

HT.08.01

TOLERANCE OF SUSTAINED VENTRICULAR FIBRILLATION DURING LEFT VENTRICULAR ASSIST DEVICE SUPPORT WITH IMPELLA CP®

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A 64-year-old man was admitted with typical chest pain, started three days before, and anterior ST-segment–elevation myocardial infarction. Urgent coronary angiogram showed a calcified left anterior descending artery with critical stenosis in the proximal and mid segments treated with Shockwave Intravascular Lithotripsy system (Shockwave Medical) and implantation of four drug-eluting stents (TIMI flow 2-3). A first echocardiogram, performed after PCI, showed reduced left ventricular ejection fraction (LVEF) of about 35% with good right ventricular function. Despite successful PCI electrocardiogram (ECG) showed persistent ST-segment elevation without symptoms. Two days later the patient developed recurrent ventricular tachycardia and an episode of acute pulmonary edema; echocardiogram showed a significant worsening of LVEF (15%) and decreasing pulse pressure. A percutaneous mechanical circulatory support device (Impella CP; Abiomed) (Figure 1, Panel A). Twelve hours later, the patient developed rapid VT degenerated in VF without loss of consciousness (Figure 1, Panel C). During the arrhythmia the patient was alert and his mental status was normal, Impella flow was 2.4-3.0 L/min, invasive blood pressure (IBP) was 80/65 mmHg (Figure 1, Panel D). Intravenous lidocaine was administered without effect. After about 10 min of incessant VF the patient received Propofol sedation by the Anestesiologist. A single unsynchronized 200 J DC shock converted the patient to sinus rhythm. In the following days the patient experienced two new episodes of asymptomatic VF treated with DC-shock after sedation and was transferred to the cardiac surgery department to undergo urgent LVAD implantation.

The patient was able to maintain adequate systemic perfusion despite prolonged VF, due to hemodynamic support provided by the Impella CP device. The Impella CP ensures a continuous aortic flow (up to 4.3 L/min) that can result in reduced or no pulse pressure. In order the device to work properly the flow in left ventricle must be maintained all the times, so the role of the right ventricle is crucial to ensure a proper function. During VF right ventricle ejection is obviously compromised and the device should not perform adequately its function. In our case, however, the patient was completely asymptomatic during 10 minutes of VF, until cardioversion. Two mechanisms can be invoked in order to understand Impella device ablility to maintain adequate pump function (about 2.4 L/min) during VF. The first one is related to the device, which in turn consists of two components: the kinetic energy developed by pumping blood in the aorta that can propagate to the peripheral territories and the suction function in the left ventricle that acts in synergy with the other mechanisms of venous return. The second mechanism is mainly represented by the respiratory pump that through the excursions of the chest is able to generate negative pressures such as to maintain in the right atrium adequate pressures able to convey the flow to the lungs. These combined mechanisms are able to maintain a proper cerebral and peripheral perfusion during VF, keeping the patient awake.