Case Report: Use of Impella 5.5 For 77 Days Prior To Heart Transplantation

Background

- Impella 5.5 is a medical device used to provide temporary ventricular support for patients with decreased cardiac function. It pumps blood from the left ventricle to the ascending aorta to help maintain system circulation at a rate of up to 5.5 L/min.
- In end-stage heart failure, it can serve as a bridge to advanced heart replacement therapies including destination left ventricular assist devices (LVAD) and cardiac transplant. Use of this device requires inpatient monitoring.
- In this case report, we describe the successful use of an Impella 5.5 for a total of 77 days as a bridge to transplant.

Case Description

- The patient is a 22-year-old female with a past medical history of Type 1 DM and acute myeloid leukemia status post chemotherapy with doxorubicin, who developed chemotherapy induced cardiomyopathy.
- Following chemotherapy, the patient presented with worsening shortness of breath, orthopnea, and nausea. A chest CT scan revealed right lower lobe subsegmental pulmonary embolism and bilateral pleural effusions. She was placed on apixaban, furosemide, and carvedilol.
- Following treatment the patient developed acute kidney injury, likely cardiorenal vs contrast induced nephropathy, and apixaban was switched to enoxaparin.
- Two days after her admission to the hospital, the patient developed chest pain, with associated nausea and vomiting. Acute coronary syndrome was ruled out with negative troponins and EKG. The following day, the patient developed cardiogenic shock with hypotension, tachycardia, and a lactic acid of 7.2 mmol/L.

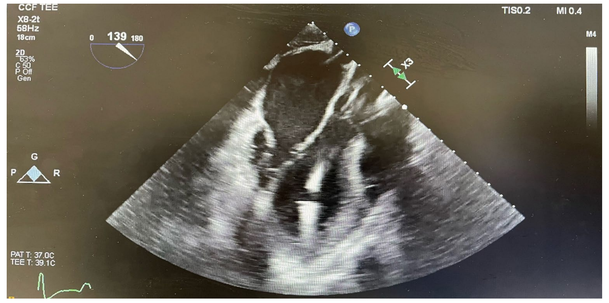

Figure 1: Transesophageal echocardiogram showing placement of Impella 5.5

Case Description Continued

- The patient was transferred to Cleveland Clinic Florida and had placement of the Impella 5.5. The patient remained on the Impella and then after 59 days she was placed on ECMO in addition to the Impella. Following placement of the ECMO, the patient was supported with both devices for an additional 18 days before she received her heart transplant.
- Upon completion of heart transplantation, the patient's post-operative course was uncomplicated, and she had both the Impella 5.5 and ECMO removed.

Discussion

- The Impella 5.5 can be a life-saving device in the management of patients with end-stage heart failure who failed medical therapy and require ventricular mechanical support.
- It can be used until improvement of cardiac function is attained in patients who are expected to have native myocardial recovery and, in terminal patients, it can work as a bridge to transplantation.

Discussion Continued

- The device is inserted through the femoral or axillary arteries and is placed in the left ventricle across the aortic valve.
- The most common indications for its use are acute myocardial infarction complicated by cardiogenic shock, to facilitate high risk percutaneous coronary intervention, to assist off-pump coronary bypass surgery, and to treat heart failure with acute decompensation.
- In September 2019, the Impella 5.5 received FDA approval for a duration of use of 14 days for the treatment of cardiogenic shock.
- In a recent study to measure the effectiveness and safety of the Impella 5.5 as a bridge to cardiac transplantation or LVAD involving 4 patients, the average duration of mechanical support was 70 days, with a maximum of 83 days.

Conclusion

- Based on the clinical case we described and additional reports found in the literature, the Impella 5.5 device appears to be a safe bridge to transplantation in patients with end-stage heart failure, possibly for a longer period than the 14 days that it is currently FDA approved for. However, larger studies are required to determine the maximal acceptable duration of use for the Impella 5.5.

References

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