Anticoagulation Therapy with Impella® Heparin Infusion

Summary
Abiomed recommends using a heparin concentration of 25 U/mL in the purge system, using the methodology described below. To optimize patient management on Impella support, anticoagulation utilizing heparin needs to account for the heparin delivered through the Impella purge system. Specifically, the heparin infused via the purge solution may provide a significant fraction of the heparin needed to maintain a patient’s ACT. Depending on a patient’s characteristics, different delivered heparin rates may be needed to maintain the recommended ACT of 160–180. There is no indication that lowering the purge heparin to 25 U/mL adversely affects the Impella Catheter.

Background
Abiomed has observed that the heparin infused through the Impella purge system is not always accounted for in institutional protocols for anticoagulation. The heparin infused via the Impella purge system should be monitored, and failure to do so may result in excessive heparin being infused, which may increase bleeding.

In some patients, the Impella purge system may provide enough heparin to fully anticoagulate the patient. For these patients, additional systemic intravenous heparin may not be needed. For other patients, the Impella purge system may provide too much heparin. For these patients, in order to maintain an optimal ACT, use of a purge fluid with a lower heparin concentration (25 U/mL) should be considered.

Putting this into practice
An ACT of 160–180 seconds is recommended for all patients while on Impella support. For the first 24 hours, it is recommended to monitor ACT levels every 3 hours until a stable ACT level is obtained. While monitoring ACTs, it is important to account for the Impella Delivered Heparin in calculating the necessary intravenous heparin rate of delivery. The Impella Delivered Heparin can be found on the Automated Impella Controller by switching to the Infusion History screen on the Display menu.

One method of taking this Impella heparin infusion into account in an anticoagulation protocol is described below.

Overall, the Total Heparin to a patient is the sum of the Impella Delivered Heparin (Heparin source: Impella purge), and the Systemic IV Heparin (Heparin source: drip):

Total Heparin Delivered to Patient = Impella Delivered Heparin + Systemic IV Heparin (1)

If your protocol does not include an allowance for heparin from the Impella purge, but calls out a specific Total Heparin, the Systemic IV Heparin can be calculated as:

Systemic IV Heparin = Total Heparin Delivered to Patient - Impella Delivered Heparin (2)
**PRODUCT UPDATE**

For example:

If the protocol specifies use of heparin 10 U/kg/hour to maintain an acceptable ACT, and the patient weighs 75 kg, the total heparin concentration would be calculated as: 10 U/kg/hour * 75 kg = 750 U/hour.

From the Infusion History Screen, the heparin concentration in the purge is 25 U/mL and the purge rate is 20 mL/hour. The Impella Delivered Heparin would be calculated as: 25 U/mL * 20 mL/hour = 500 U/hour

Using equation (2) above:
IV Heparin = 750 U/hour – 500 U/hour = 250 U/hour of heparin or 2.5 mL/hour of heparin drip at a concentration of 100 U/mL

Patients who are returning to the ICU after having had an Impella pump placed may have received significant amounts of anticoagulant medications during the procedure. While it is critical to have heparin in the purge fluid as soon as practical, a repeat ACT should be obtained prior to administering additional purge heparin to avoid a seriously prolonged ACT that may result in bleeding issues.

Impella Catheter data supports use of 25 U/mL or 50 U/mL in the purge system. Pump performance is not adversely affected when operating at 25 U/mL heparin concentration (data on file).

For further information on the Impella Delivered Heparin, please refer to the Instructions for Use or contact Abiomed’s Clinical Support Center, 1-800-422-8666.