

Endovascular Measurement Protocol

Flow Measurements in Fistulas & Grafts

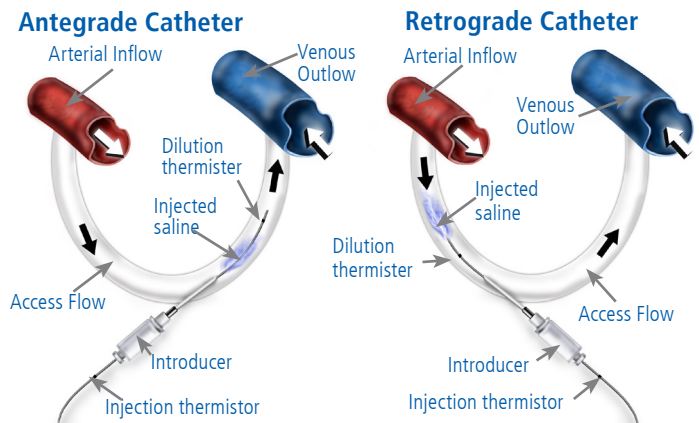
- 1) Connect the HVT100 Endovascular Flowmeter to a grounded power receptacle. Turn on POWER.
- 2) Record flow information by plugging in a USB on the rear panel of a computer and start the data acquisition software.
- 3) Select either an Antegrade or Retrograde sterile ReoCath® Flow Catheter, open pouch and pass the connector to the non-sterile field.
- 4) Remove the distal cap, curve retainer, and tag from catheter.
- 5) Have a nurse outside the sterile field attach the connector of the ReoCath® to the extension cable and connect the extension cable to the HVT100.

NOTE: The system will not determine the type of catheter until it is inserted into the introducer.

- 6) Open the stopcock on the ReoCath® Flow Catheter and fill the catheter with isotonic saline. Close the stopcock.
- 7) Insert the catheter through the 6F or larger introducer until the marker band is visible outside the sheath.
- 8) Press the START button on the front of the Flowmeter.
- 9) The HVT100 will display "WAIT". The catheter indicator light will display which catheter type is attached, either "Antegrade" or "Retrograde".
- 10) After 15-20 seconds the HVT100 will display "READY". Open the stopcock on the ReoCath® Flow Catheter and inject 10 ml bolus of room temperature saline (20-25°C) into the catheter in one smooth, continuous motion over 2 - 3 seconds. When the dilution thermistor detects the start of an injection the display switches to "INJ. 03" and counts down to "INJ. 00" Use this countdown to help make consistent injections.

REOCATH® FLOW MEASUREMENT TIPS

- Once the stopcock is opened, perform injection immediately. Do not let blood flow into the injection lumen.
- After the injection, close the stopcock to avoid blood from entering the injection lumen.
- Do not stop the injection or change rate of injection when the display changes from "READY" to "INJ. 03". Make sure the injection is complete by the time the countdown reads "INJ. 00". Variability or disruptions in the injection will invalidate the flow measurements and cause the display to read "REPEAT".
- The FULL 10 mL syringe must be injected. Variability in injection volume or time will cause errors and variability in measurements.



On the left, an antegrade catheter (6 F, 35 cm length) is shown inserted into an AV access in the same direction as access flow. After injected saline is released from the catheter, a dilution thermistor, downstream at the catheter tip, measures the temperature of blood, diluted by the injected saline. On the right, a retrograde catheter (6 F, 48 cm length) is likewise inserted into an AV access, but against the direction of access flow. After injected saline is released from the tip of the catheter, a proximal dilution thermistor measures the temperature of the saline-diluted blood. Classic dilution equations are used to extrapolate blood flow in mL/min from the temperature changes between the saline measured by injection thermistors and the saline-diluted blood measured by the dilution thermistors.

- 11) Close the stopcock.
- 12) The HVT100 display will change to "PROC. 21" and countdown to "PROC. 00".
- 13) The HVT100 display will change to "CALC. 10" (at this point the HVT100 is calculating the flow) and then will countdown to "CALC 00".

NOTE: At some point during the CALC. process, the display may pause momentarily (this is normal).

- 14) Blood flow will be displayed in mL/min on the HVT100.
 - a) If there was a problem with the injection, the display will read "REPEAT". Repeat the measurement from Step 7.
- 15) Repeat steps 7-12 above, an additional one to two times to ensure the reproducibility of the first measurement.
- 16) Remove the catheter from the introducer and keep it in the sterile field if more measurements are to be performed.
- 17) Dispose of catheter according to standard hospital procedures.
- 18) The HVT100 and extension cable can be cleaned with alcohol.

CAUTION

A ReoCath® Flow Catheter is pre-sterilized and intended for single patient use. Do not re-use or re-sterilize.

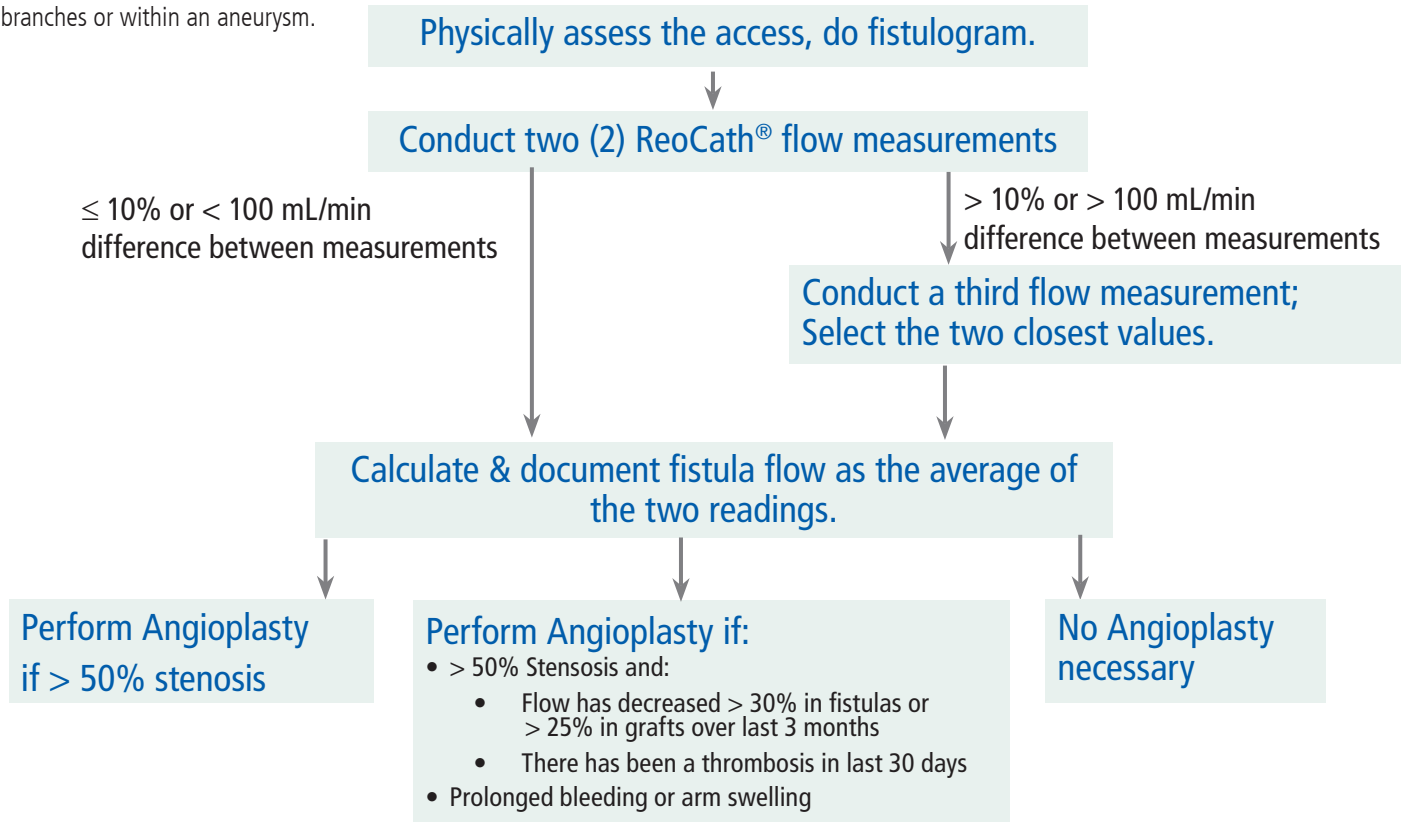
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ReoCath® Flow Measurement Protocol

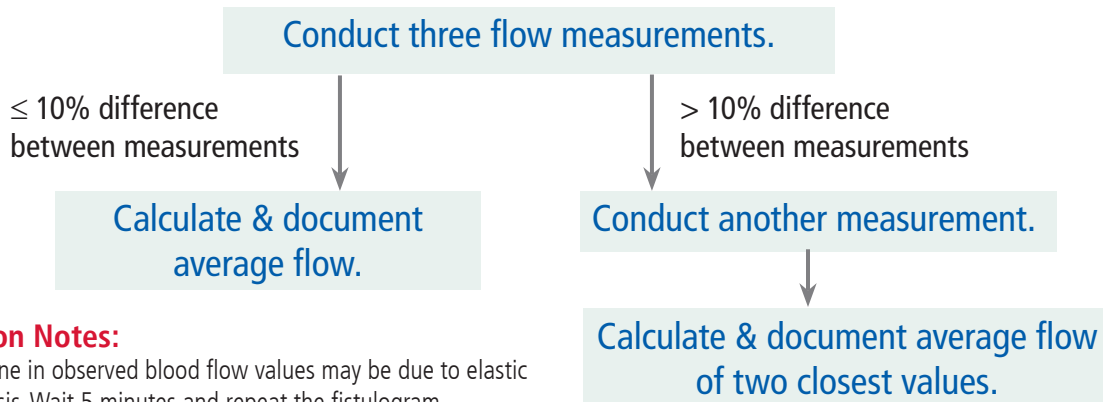
PRE-INTERVENTION

Pre-intervention Notes:

1. Do not cross a stenosis with the catheter.
2. Avoid catheter tip placement near side branches or within an aneurysm.



POST-INTERVENTION



Post-intervention Notes:

1. A progressive decline in observed blood flow values may be due to elastic recoil of the stenosis. Wait 5 minutes and repeat the fistulogram.
2. A progressive increase in blood flow values may be due to relaxation of spasm. Wait 2-3 minutes and repeat blood flow measurement.