

HFMC AVF Post-Operative Ultrasound Assessment Imaging Protocol

NOTE:

Abbreviation key at end of protocol

All diameters measured in AP dimension, transverse plane, gray scale

All spectral waveforms measured in longitudinal plane, color Doppler with angle correction, angle $\leq 60^\circ$. Measure PSV, EDV on all spectral measurements

1) FOREARM AVF

Brachial Artery (BA) (2 cm cranial to antecubital fossa) *

Diameter (cm) (inner to inner)

Spectral

Blood flow x 3 (Gate diameter to include entire vessel, spectral measurement to include 3-5 waveforms)

Radial Artery (RA) (2 cm cranial to anastomosis)

Diameter (cm) (inner to inner)

Spectral

Anastomosis (ANAS)

Spectral

Gray scale image, longitudinal

Cephalic Vein (CV): Measure distance from anastomosis, depth from skin surface (cm)

2 cm: Diameter, depth

5 cm: Diameter, depth

10 cm: Diameter, depth

15 cm: Diameter, depth

Note location, diameter for each branch (BR) in FA in first 15 cm CV

Assess diameter for entire AVF draining vein in both FA and UA. Measure distance from anastomosis (FA) or antecubital fossa (UA)

Maximum diameter of cephalic vein, location (cm)

Minimum diameter of cephalic vein, location (cm)

2) UPPER ARM AVF

Brachial Artery (BA) (2 cm cranial to anastomosis) *

Diameter (cm) (inner to inner)

Spectral

Blood flow x 3 (Gate diameter to include entire vessel, spectral measurement to include 3-5 waveforms)

Anastomosis (ANAS)

Spectral

Gray scale image (longitudinal)

Cephalic Vein (CV) or Basilic Vein (BAV): Measure distance from anastomosis, depth from skin surface (cm)

2 cm: Diameter, depth

5 cm: Diameter, depth

10 cm: Diameter, depth

15 cm: Diameter, depth

Note location, diameter for each branch (BR) in UA AVF in first 15 cm CV or BAV

Assess diameter for entire AVF draining vein in UA. Measure distance from anastomosis (FA) or antecubital fossa (UA)

Maximum diameter of cephalic vein, location (cm)

Minimum diameter of cephalic vein, location (cm)

- 3) Measure blood flow x 3 at mid FA AVF or mid UA AVF in straight vein segment. Record the distance of this segment from the anastomosis and use for next assessment. Optimal location is mid FA or UA at 10 cm from anastomosis, but distance may vary depending on location of branches, tortuosity of vein, etc.
- 4) If a visual stenosis $\geq 50\%$, measure color Doppler longitudinal image with spectral waveform at stenosis and 2 cm caudal to stenosis (upstream). Take longitudinal image and measure length of stenosis.
- 5) If patient complains of arm swelling, or other abnormality apparent, assess brachial veins (BRV) for thrombus. Assess subclavian vein (SCV), internal jugular vein (IJ) for transmitted cardiac pulsatility, respiratory phasicity, stenosis, and thrombus.

* If high radial artery take off, measure blood flow in both radial (RA) and ulnar (ULNA) arteries 2 cm cranial to antecubital fossa, as well as the diameter of both arteries.

ABBREVIATION KEY:

AC = antecubital

ANAS = anastomosis

AXV = axillary vein

BA = brachial artery

BAV = basilic vein

BR = branch

BRV = brachial vein

CA = caudal

CR = cranial

CV = cephalic vein

EDV = end diastolic velocity

FA = forearm

IJ = internal jugular vein

MAV = median antecubital vein

MID= mid

PSV = peak systolic velocity

RA = radial artery

SCV = subclavian vein

UA = upper arm

ULNA = ulnar artery

WR = wrist