

# **ROUTINE MANAGEMENT of vascular access**

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## Regular monitoring of vascular access

# Checks before each cannulation

**Inspection** for signs of:

- infection (redness, discharge, edema)
- aneurysms (may be cannulated using the lateral side if no stenosis),
- hematoma and color of the hand (blue, red, white)

## **Palpation**

Along the access from arterial anastomosis up to the outflow veins.

- Normally a strong thrill and weak pulsation are felt
- Intravascular pressure should be equal at any segment
- Differences in pressure and increased pulsation indicate stenosis
- Not reliable in graft.

## **Auscultation**

- Normally reveals a typical thrill with a long diastolic component that is shortened in case of stenosis.
- Stenosis causes a high pitch bruit,
- In thrombosis there will be no bruit at all.
- More reliable in graft

## Regular monitoring of vascular access

# Check during and after each cannulation

Observations should be documented in the patients' medical records and addressed by the medical team.

### **Ease of puncture**

- Normally, fistula needle easily advance into the access.
- Resistance of fistula needles can indicate:
  - Needle is not within the access lumen
  - Needle may have entered the back wall
  - Presence of pseudo-intimal hyperplasia or thrombus

### **Aspiration of clot**

- Suggests impending thrombosis and is an indication for further access evaluation (U/S or angiography).
- Might also be caused by improper placement of the needle.
  - Clot aspiration is not an indication for anti platelet agent

### **Prolonged bleeding**

Raises suspicion of high intra-access pressure, outflow stenosis , excess heparinization, access laceration , skin atrophy or local inflammation

# Regular monitoring of vascular access

## Check during each HD session

### Access Recirculation

- Occurs when the access flow is lower than the prescribed pump flow.
- More common in AV fistulas since they remain patent even access flow  $< 400$  ml/min.
- Grafts tend to clot when access flow is less than 600-800 ml/min.

### Increasing Venous Line Pressure

- May indicate venous outflow stenosis .
- A single venous pressure monitoring is not predictive of graft failure
- Repeated venous pressure of 150 mm hg with 16 gauge needle at 200 - 225 ml/min may be indicative of venous outflow stenosis.
- Upper AVFs behave like a graft due to their sniffle venous outflow.

### Decreasing Arterial Line Pressure

- A.P  $< - 150$  mm hg frequently indicates inflow disease.
- High negative pressures correlate with the development of hemolysis and may be damaging to the access wall.

## Regular monitoring of vascular access

# Check Monthly in AVF & Graft with Dysfunction

**Goal:** Prospective monitoring techniques combined with early correction of stenosis improves up to 70% in cumulative access patency.

### Screening procedures

- Physical examination
- Measurement of:
  - Vascular access flow ,
  - Recirculation
  - Venous pressure and
  - Color-coded duplex ultrasound.
- Use more than one screening test to monitor vascular access performance in order to predict complication.
- Vascular access flow is probably the most useful and reliable parameter available, especially if performed serially.
- Low delivered dialysis dose may indicate insufficient blood flow or high recirculation possibly due to stenosis.

# Vascular access flow $Q_a$

## Direct measurement of access blood flow ( $Q_a$ )

- Best method to monitor vascular access function and predict vascular access failure
- serial  $Q_a$  determinations are more effective than a single measurement
- $Q_a$  can be determined by Doppler ultrasound or dilution methods (e.g. Haematocrit dilution, thermodilution..).
- Recommended to measure  $Q_a$  during the first 90 min of the dialysis session.
- Angiography should be performed when:
  - Access flow falls below 500 - 600 ml/min in native A/V fistula and 650 to 800 ml/min in grafts
  - Reduction of  $Q_a$  by 20-25%

## **Measurement of recirculation**

Recirculation is less popular since it detects stenosis relatively late. Moreover, its predictive value is poor in grafts.

## **Static intra-access venous pressure**

Less accurate in A/V fistulas than in grafts,  
Collateral vessels might be present or develop,  
preventing a marked increase in venous pressure.

# Appropriate preparation of cannulation site

in order to reduce the risk of infection and bacteraemia, the cannulation site should be cautiously prepared.

- The needle site should be palpated before preparation of skin. After cleaning the skin with warm water and soap, chlorhexidine should be applied, which is a better antiseptic than povidine iodine.
- If povidone iodine is used, 2-3 min is required to allow it to dry.
- Alcohol 70% is used in patients who have side effects with the other antiseptics, at least 1 min is required.



## **Rotating sites (“ROPE LADDER”):**

In A/V fistula the rotating cannulation site cause a regular, but moderate dilatation of the vein. it is the favored technique

Cannulation of only a small area of the access by gradually weakening the access wall causes aneurysms in A/V fistulas and pseudo-aneurysms in grafts ,thus destroying the later.

## **Buttonhole technique (constant-site method)**

When the vascular access is always punctured at the same place, with same angle using the same tunnel for the cannula. Over time, the tissue around the needle becomes scarred, thus directing the needle to the vascular access.

It is recommended for self-cannulation.

There is less bleeding, less pain and less cannulation failure.

# **mupirocin treatment intranasal**

the infection can be reduced fourfold by the eradication of *S. Aureus* by nasal mupirocin treatment.

Some recommend screening of all patients with a past history of *S. aureus* infection and to consider intervention.

# Documentation of findings

For fistula and graft

- Inability to cannulate
- Hemostasis time prolonged
- Dose of dialysis not delivered
- Prescribed blood flow not achieved/ decreased access flow
- Signs of infection

# Summary of access monitoring

- Prospective surveillance of access
- Look for stenosis malfunction
- Pre-emptive correction improves patency rates and life expectancy of the access.