Hemodialysis: A-V Fistula/PTFE Grafts for Hemodialysis, Care and Management of the Patient

This guideline is due for review, BUT STILL BEING USED WITHIN THIS ORGANIZATION. Please contact the unit of origin to DISCUSS ANY CONCERNS REGARDING CURRENCY of this information.

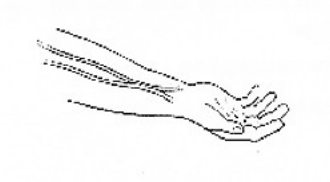
Site Applicability

VGH

Background Information

For patients with end-stage renal disease (ESRD) and requiring hemodialysis, vascular access is of utmost importance. The arteriovenous fistula (AVF) and the PTFE grafts are generally used to create permanent vascular access.

The AVF is created by surgically connecting an artery and vein together. The arterial blood flow causes enlargement of the venous system and takes 6-8 weeks to mature. It is considered the best permanent access because of low infection rates as well as decreased incidence of thrombosis.



Internal Fistula (AVF)

PTFE grafts (polytetrafluoroethylene) are another common way of providing access to the bloodstream. A short piece of tubing is placed under the skin connecting an artery and a vein. Grafts can normally be used within two weeks of surgery.

Internal Graft

Vessels in the upper extremities are preferred for creation of AVF/PTFE grafts because of generous collateral blood supply and absence of significant atherosclerosis. Distal sites are usually selected first

with the best result achieved using the radial artery and the cephalic vein at the wrist. Other options include use of the upper arm or thigh.

Goal

By discharge, the patient will understand the interventions necessary to minimize potential complications associated with the creation of A-V fistulas/PTFE access grafts. These potential complications include:

- Thrombosis
- infection
- hematoma
- distal ischemia
- neuropathy
- aneurysm formation
- distal venous hypertension.

Procedure/Recommendations/Assessment

Pre-Operative Assessment

Assess patient's knowledge and understanding of disease process (ESRD) and anticipated surgery.

- If patient is undergoing surgical revision or removal of an A-V fistula/PTFE access graft, assess patient's knowledge of factors which may have contributed to development of complications.
- On admission, assess and identify any factors which may have contributed to development of complications:
- circulation to skin and underlying issue
    - hemoglobin
    - color and warmth of affected limb
    - peripheral pulses
    - edema
    - hypotension
    - smoking
- other diagnoses/diseases that may contribute to impaired wound healing, eg. diabetes, peripheral vascular disease
- condition of surrounding skin:
    - macerated
    - irritated
    - indurated
    - intact

- presence or absence of local signs and symptoms of infection:
  - erythema over graft
  - purulent drainage from a puncture site
  - positive C&S results
  - presence of an inflammatory pseudoaneurysm near prosthetic graft anastomosis
- presence or absence of systemic signs and symptoms of infection
  - leukocytosis
  - fever
  - malaise
  - positive blood cultures
- nutrition and hydration status
- positioning of affected limb
- extrinsic compression of affected limb.

Pre-Operative Intervention

- Assist in pre-operative patient preparation:
  - avoid constricting clothing, dressings, blood-pressure cuffs and venipuncture on the operative arm as they restrict venous outflow and may impair integrity of the vessels
  - implement measures to ensure that integrity of the operative arm is maintained, e.g. mark blood requisitions, place a sign at head of patient's bed, enter in kardex.

Post-Operative Assessment

- Assess patient's knowledge and understanding of interventions necessary to minimize post-operative complications, including:
  - elevation of limb
  - positioning of limb.
- Assess operative limb for the following:
  - colour and warmth
  - peripheral pulses edema
  - presence of thrill/bruit
  - **Note:** When high pressure arterial blood flows into a contiguous vein, a buzzing vibration (THRILL is produced that can be palpated with the fingertips. As well, a rushing sound (BRUIT) can be auscultated with a stethoscope over the venous limb of the fistula/graft.
  - numbness and tingling
  - pain.

Post-Operative Intervention

- Vital signs q4h for 24 hours, then qid or as ordered by physician. Risk of graft thrombosis increases if patient hypotensive.
- Ensure patency of A-V fistula/PTFE access graft by checking for presence of thrill/bruit q4h.
- **Note:** May be ordered more frequently (q1-2h) in the initial post-operative period. Report loss of or a diminished thrill/bruit to the physician immediately. This may indicate a complete or partial obstruction.
- Elevate operative arm on pillow for 24 hours to minimize swelling. Some degree of swelling is usually present due to venous hypertension but subsides after a few weeks.
- Ensure operative arm is kept straight for 24 hours to minimize risk of early post-operative thrombosis. Ensure patient does not sleep on arm.
- Assess dressing q4h for excessive bleeding. The initial dressing can be left intact for 48 hours unless excessive bleeding occurs.
- Change the dressing daily after 48 hours post-operatively, inspecting the incision for signs and symptoms of infection, including:
    - erythema
    - warmth
    - excessive tenderness
    - drainage.

  Dressing may be left off after 48 hours if the wound is healing well.

- Avoid constricting dressings, blood-pressure cuffs on the operative arm as they restrict venous outflow.
- Operative arm is not used for intravenous access or for venipuncture. **MARK ALL BLOOD WORK REQUISITIONS. PLACE A SIGN AT BEDSIDE. ENTER IN PATIENT CARE PLAN.**
- On the 3rd or 4th post-operative day, light exercises can be performed by very gently squeezing a soft ball or a small orange for 5 minutes a day.

Patient Teaching

- An internal fistula/graft places minimal restrictions on lifestyle. Most activities can be safely resumed a few weeks after surgery. Tub bath/shower can be resumed when the wound has been healed.
- Avoid wearing tight clothing, hanging things over the arm, e.g. purses, shopping bags, or carrying heavy objects. Do not sleep on the arm or have the arm bent for long periods of time. These activities may impede flow of blood through the fistula/graft.

- Check for flow of blood through the fistula/graft every morning and several times throughout the day by feeling for a thrill or listening for a bruit. Reports loss of thrill or bruit or difficulty feeling thrill or hearing bruit to the nephrologist and/or nurse in the Renal Unit immediately.
- Never allow anyone to draw blood or take a blood pressure on the operative arm unless they have been authorized to do so by the nephrologist or vascular surgeon.
- Change the protective dressing every day until the sutures are removed. Dressings may be removed earlier if the wound is healing well. Sutures are usually removed 7-10 days after surgery. This may be done in the Renal Unit or in the physician's office. Once the sutures are removed, keep the area over the fistula/graft clean and dry.
- Report any redness, swelling, excessive tenderness or drainage to the nephrologist or nurse in the Renal Unit immediately.
- Light exercise can be started on the 3rd or 4th day after surgery. Very gently squeeze a soft ball or small orange for 5 minutes/day. Three weeks after creation of the fistula/graft, a progressive exercise plan will be taught by a nurse in the Renal Unit to help expand the veins of the arm above the fistula/graft so that needles can be inserted for dialysis. It may take up to 12 weeks before the veins are large enough.
- Report any numbness, tingling, pallor, coolness and pain to the nephrologist or nurse in the Renal Unit immediately. This could indicate distal ischemia or an arterial "steal syndrome" which may be intensified on dialysis.
- Report numbness, especially in the area of the median nerve, which may indicate nerve ischemia stemming from edema or an arterial steal syndrome.
- Dilation of the venous limb of an A-V fistula often does not require treatment and may actually increase the ease of needling the fistula. Dilation of PTFE access grafts usually occurs as a result of needling the graft repeatedly in the same area.

  False aneurysms rarely occur with A-V fistulas. A false aneurysm in a PTFE access graft may result from a needle laceration or inadequate compression following needling of the graft which leads to hematoma. If not infected, these grafts can usually be repaired by excising the damaged section of graft and interposition of a new segment.
- Report excessive swelling to operative limb. Rarely, increased venous pressure may occur in tissues distal to the fistula, resulting in chronic edema and the development of varicosities. Surgical correction involves ligating the vein distal to the fistula.
- Ensure patient receives the handouts "Care of Your A-V Fistula" and "Vascular Access" prior to discharge. These are available on W8 - Vascular Surgery as well as the Hemodialysis Unit.

UNIT(s) OF ORIGIN: Vascular Surgery, August 1997

Alternate Search Terms

AV fistula