Objections

- Define hemodialysis
- Identify the indications for hemodialysis
- Define the different methods of vascular access for hemodialysis
- Identify reasons for hemodialysis access failure or troubles that occur
- Explain how to troubleshoot and fix non-functioning hemodialysis vascular access
- Review new trends in Hemodialysis vascular access
Definition

- **hemodialysis**

/həˈmōdēələˌjē-əs/ (-di-əlˈē-sis) removal of certain elements from the blood by virtue of the difference in rates of their diffusion through a semipermeable membrane while being circulated outside the body; the process involves both diffusion and ultrafiltration.
History

- 1854 First Hemodialysis machine made in England using ox bladder
- 1924 first Human Hemodialysis performed in Germany
- 1940 use of cellophane membrane bath used in hemodialysis (Artificial Renal Substitute Therapy)
- 1960’s saw first use of grafts and shunts for dialysis
Indications - Emergent

- **A**: Acidosis
- **E**: Electrolytes
- **I**: Ingestions
- **O**: Overload
- **U**: Uremia
Indications-Chronic

- Declining Nutritional Status
- Persistent and difficult to treat volume overload
- Fatigue and Malaise
- Mild cognitive impairment
- Refractory acidosis: hyperkalemia and hyperphosphatemia
Vascular access for Hemodialysis-Emergent

Non Tunneled Hemodialysis Catheter
Tunneled Vascular Access
Problems with Catheter access

- Infection
- Fibrin sheaths
- Thrombus
- Temporary
- Catheter malfunction
- Vascular problems
Permanent Hemodialysis
Vascular Access

- Fistula
- AV graft
- HeRO graft
Fistula

- 1966 was introduction of Brescia-Cimino fistula
- The procedure uses patient own vessels to make a fistula
- When the artery and vein are joined together they will make the vein larger and stronger tolerating multiple needle sticks
Radiograph of fistula
Arteriovenous Graft

A graft that surgically creates an artificial/superficial bridge between artery and vein to allow for easy cannulation
Arteriovenous Graft

- Most common materials for construction:
  - Polytetrafluethylene or PTFE
  - Bovine carotid or mesenteric vein
  - Ovine collagen with mesh
  - Saphenous vein
  - Polyurethane
  - Silicon
  - Dacron
Radiograph of AVG
Hemodialysis Reliable Outflow Graft (HeRO)

- Device is a hybrid between AV graft and dialysis catheter to be used in patient’s whom venous access sites suitable for traditional fistulas and grafts have been exhausted.
HeRO graft

- 6mm inner diameter expanded polytetrafluoroethylene (PTFE) graft attached to 5mm inner diameter nitinol-
Problems

- Infection
- Cannulation problems/pain
- Body image
- Thrombus of Fistula or graft
- Maturation issues
- Stenosis
Infection
Cannulation Issues
Body Image
Clotted Fistula
Clotted fistula-open
Maturation
Angioplasty
Anginoplasty
Fistula open, maturation
Stenosis-outflow

Cephalic vein
After angioplasty
Clotted HeRO graft
After declot
Angioplasty of fistula with Rupture
Angioplasty near anastomosis
End Run after angioplasty
Rupture of fistula-DSA
Rupture of fistula-Native
Aneurysm
Aneurysm with stent
Resistance to permanent access

- Previous negative experience
- Pain
- Age
- Waiting for transplant
- MD said OK to CVC
- Get on/off machine faster
- Body image
- Told they would regain function
Conclusions

- Get patient’s a fistula before they need it
- Avoid any kind of central venous catheter for risk of infection
- Teach patient and family about the care of their access
- Recognize what may be wrong from the information from patient or dialysis
- Watch for the unexpected and be ready for anything
DON'T PANIC


References


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