

Hemodialysis Access / Heparinization

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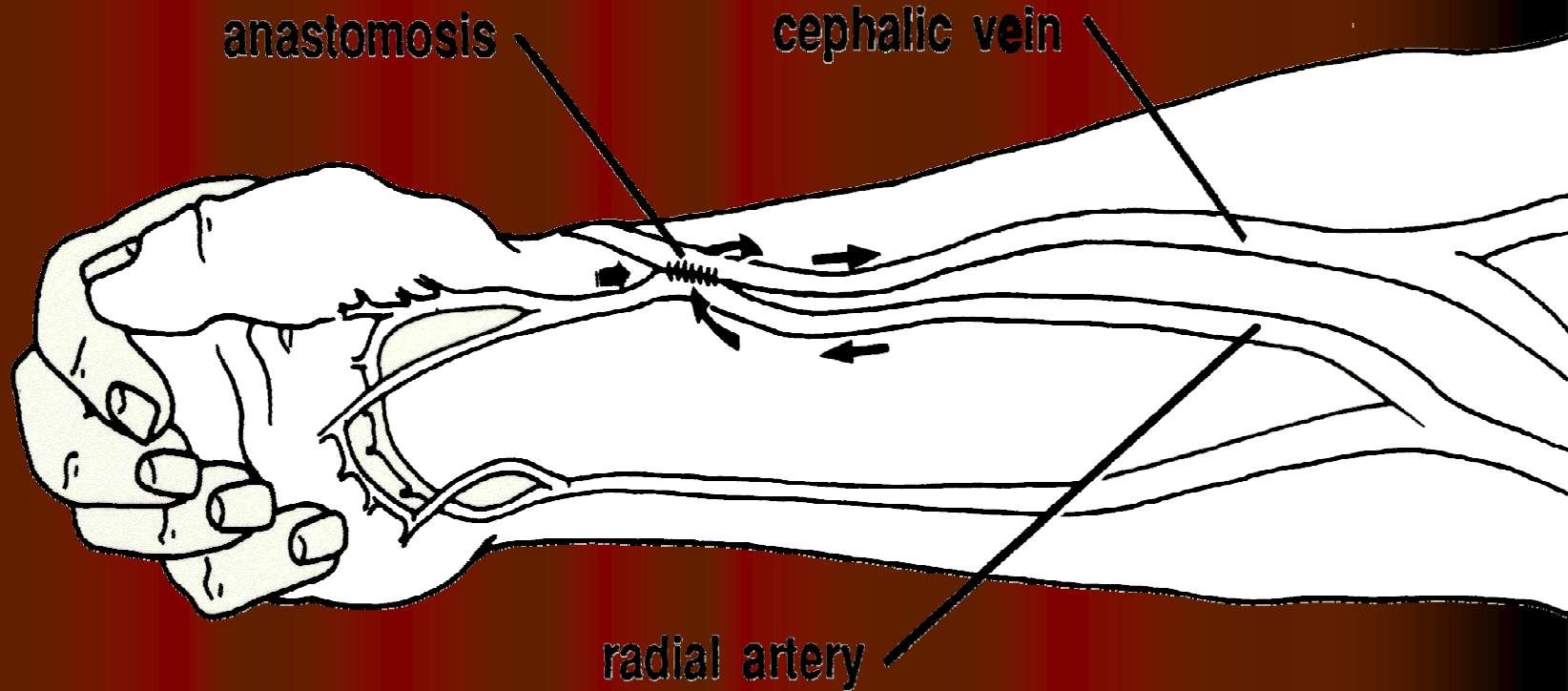
Access

Historical Background

- 1940's
 - surgical cutdown, glass/metal tubes
- 1950's
 - polyvinyl chloride/plastic material
- 1960's
 - Teflon tubes, connected externally – Shunt
 - Forearm internal arteriovenous fistula – AVF
- 1970's
 - Internal synthetic graft material – AVG
 - Temporary access via special catheter –
subclavian/internal jugular vein (IJ)
- 1980's
 - "Button" needle- free form of vascular access

Internal Access

Ateriovenous fistula (AVF)



AV Fistula Anastomosis Placements



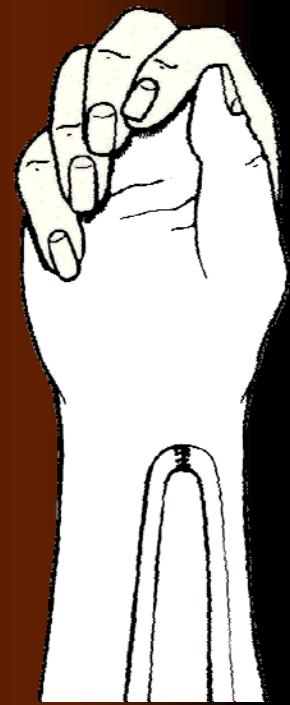
Side-to-Side



Side-to-End



End-to-Side



End-to-End

AV Fistula

- Advantages

- Longevity
- Lower incidence of clotting
- Lower incidence of infection
- One anastomosis
- Collateral circulation

- Disadvantages

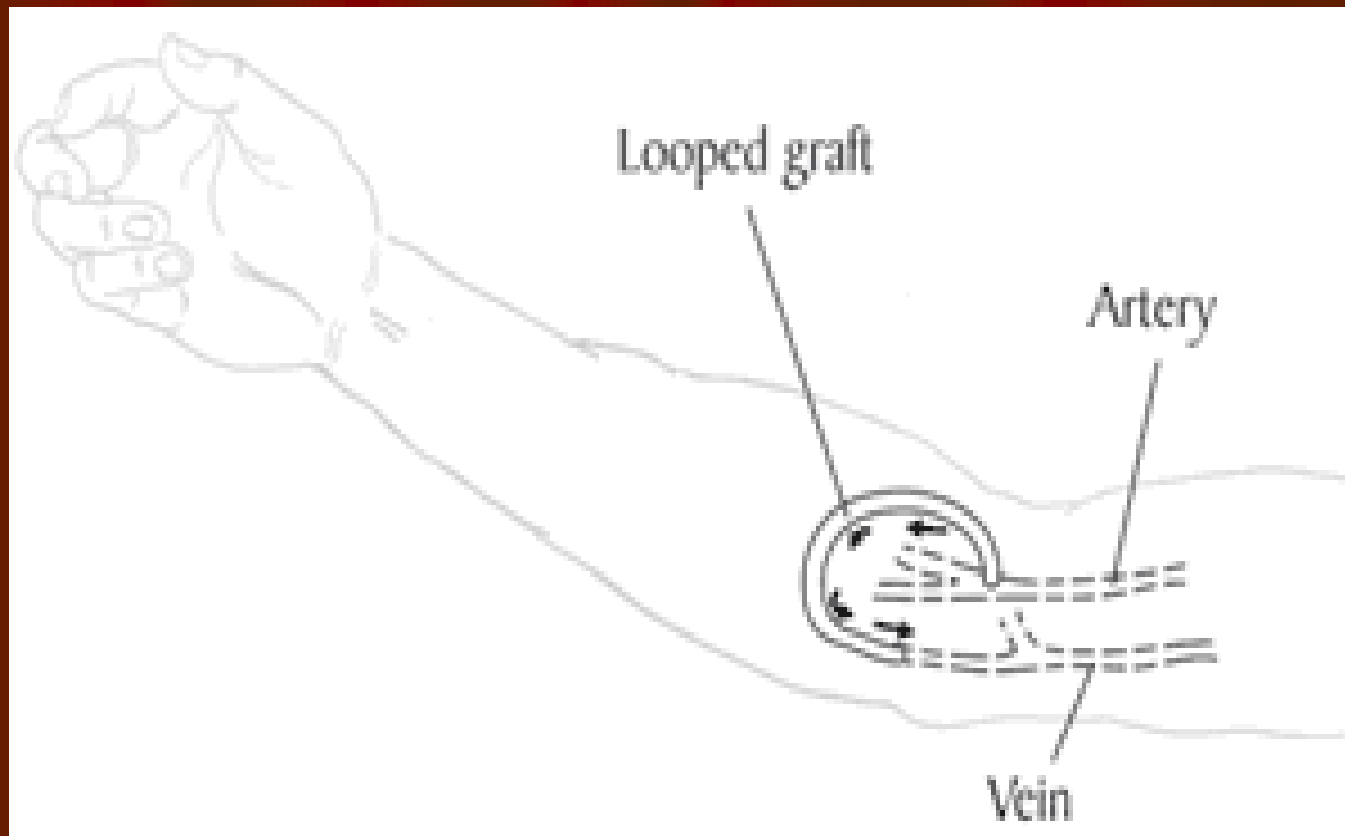
- Length of time for maturation
- Failure of vein to enlarge
- Poor Blood flow
- More difficult to cannulate
- Hematoma

Complications of the AVF

- **Poor Flow**
- **Thrombosis**
- **Pseudoaneurysms**
- **Infection**
- **Steal syndrome**
- **Aneurysms**

Internal Access

Arteriovenous Graft (AVG)



AV Graft

- Advantages

- Use sooner than an AVF
- Larger cannulation site
- Size and blood flow are not dependent on maturation

- Disadvantages

- Higher rate of infection
- Bleeding time
- Higher rate of thrombosis
- No development of collateral circulation

Complications of the AVG

- Thrombosis
- Infection
- Steal syndrome
- Pseudoaneurysms
- Stenosis and Thrombosis

Detection of Stenosis/Thrombosis AVF and AVG

- Venous pressure > 150 mm/hg @ 200-225 ml/min blood flows
- Intragraft pressures > 50 mm/hg with blood pump off
- Recirculation $> 15\%$
- Physical findings
- Color doppler ultrasound
- Angiography

Venipuncture Considerations

AVF and AVG

- Assess for signs/symptom of infection
- Palpate the access
- Rotate insertion sites to maintain integrity
- Select sites for proper placement of needle tips
- Prepare sites appropriately
- Apply a non-occlusive tourniquet

Venipuncture Considerations

AVF and AVG

- Pull skin taut in opposite direction of insertion
- Common angle of insertion:
 - * 20-35 degrees for AVF
 - * 45 degrees for AVG
- Never force a needle
- Needles should not be "flipped"
- Do Not flatten the angle of the needle with taping

Hemostasis AVF and AVG

- Mild to moderate pressure applied to site
- Use of two fingers to hold pressure
- Assure blood flow through the vessel
- Rules for prolonged bleeding

Hematoma – Infiltration Management AVF and AVG

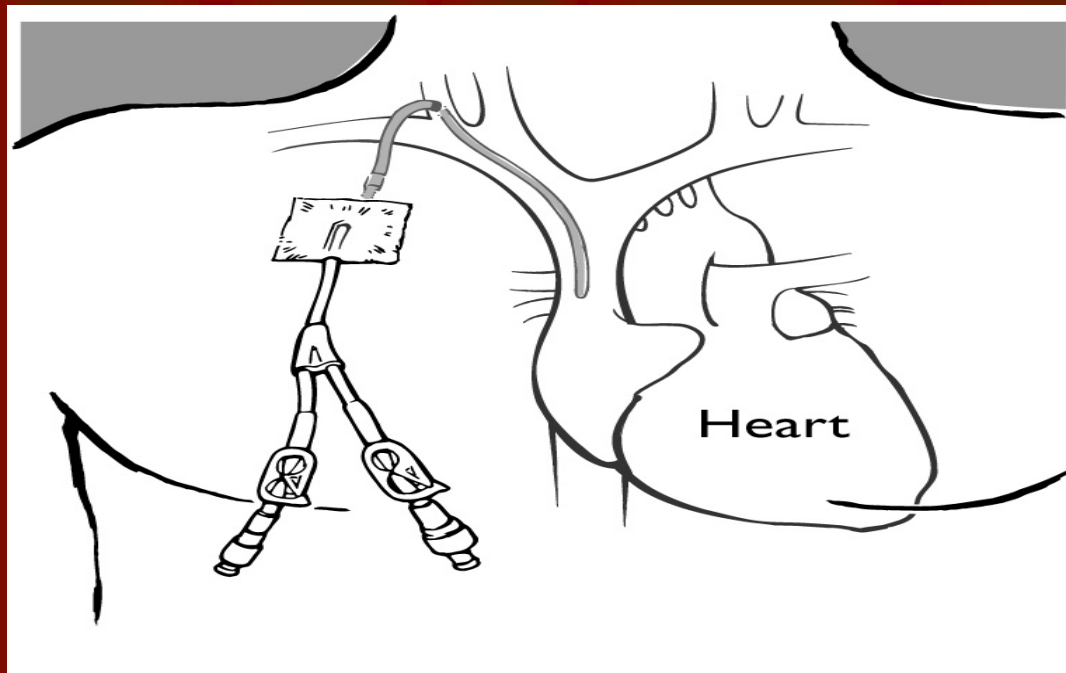
- Initiation of therapy
- During therapy
- Post therapy

External Access Central Venous Catheter (CVC)



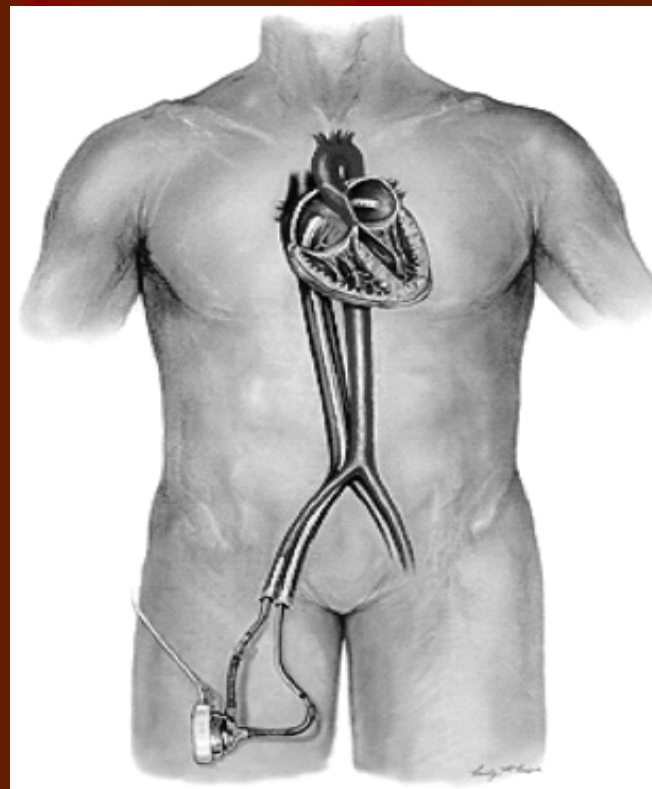
CVC Locations

- Subclavian



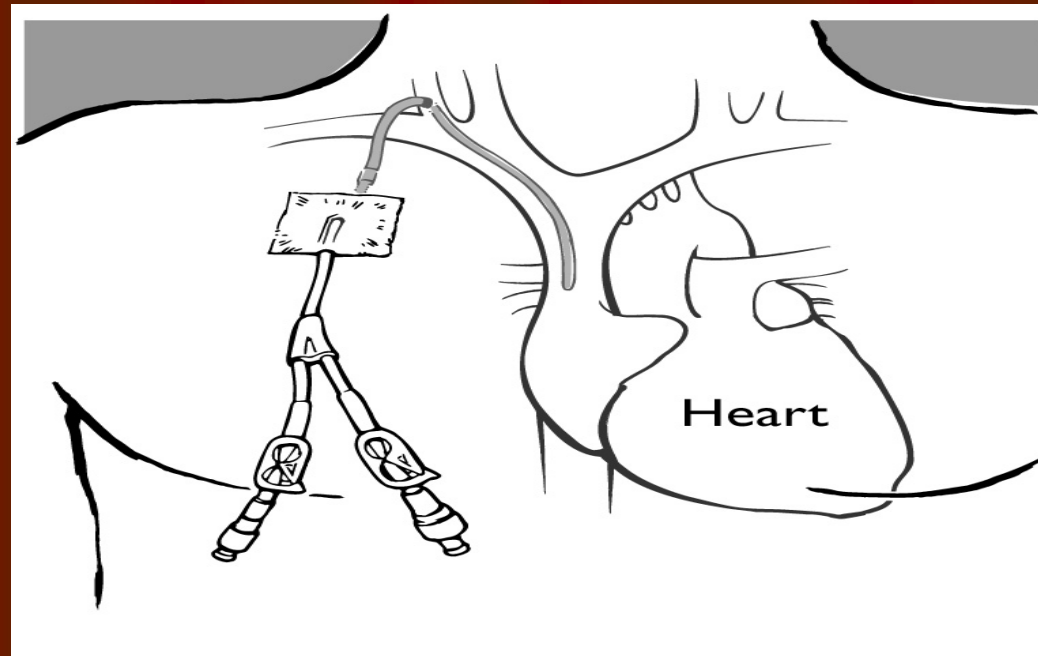
CVC Locations

- Femoral vein



CVC Location

- Internal jugular vein



CVC Complications

- Insertion related
- Infection
- Thrombosis
- Central Venous Stenosis
- Perforation

Heparinization



Coagulation

Coagulation:

- Is a complex process by which blood forms clots
- Is an important part of hemostasis
- Involves both a cellular and protein component
- Begins almost instantly after injury to a blood vessel

Coagulation Cascade

- Platelet Activation
- Coagulation cascade
 - Tissue Factor
 - Contact Activation
 - Final common pathway
- Regulators
- Fibrinolysis

Heparin

- Natural substance in our body
- Commercially prepared from animal mucosa
- Is given parenterally
- Does not dialyze off
- Does not dissolve clots
- Effects can be reversed

Anticoagulation Cascade with Heparin

- Heparin binds to Antithrombin
- Antithrombin inhibits prothrombin to thrombin formation
- Thrombin to Fibrinogen is inhibited
- Fibrinogen is unable to convert to fibrin

Heparinization - Methodology

- Systemic
- Regional
- Baseline
- Controlled
- Tight

Anticoagulation Tests

- Whole blood clotting time
- Whole blood activated clotting time
- Whole blood partial thromboplastin time

Principles of Anticoagulation

- Computerized Model
- Heparinization based on patient weight
- Heparinization based on Dr Ward Formula

Importance of Proper Heparinization

- Communication
- Optimal Outcomes
 - anemia
 - URR clearance
 - Reuse
 - Ultimately Patient Quality of life

What Happens in Vegas stays in Vegas



What is Learned in Vegas Stays with YOU in providing optimal patient care!



References

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