MRAD 240: Specialized Imaging 1

Venipuncture

MRT Program

Objectives

- Discuss anatomy and procedures associated with venipuncture
- Describe all equipment required to perform venipuncture
- Describe infection control measures needed for maintaining aseptic technique in venipuncture
- Describe the challenges of venipuncture and how to overcome them

Intravenous Cannulation

- Administering medication, fluids, or blood products directly into a vein
- Rapid infusion into the cardiovascular system
- Why do we need it in the X-ray department?
  - Most common reason-Contrast administration
  - Angiography-Antibiotic and saline administration for lumbar provocative discography

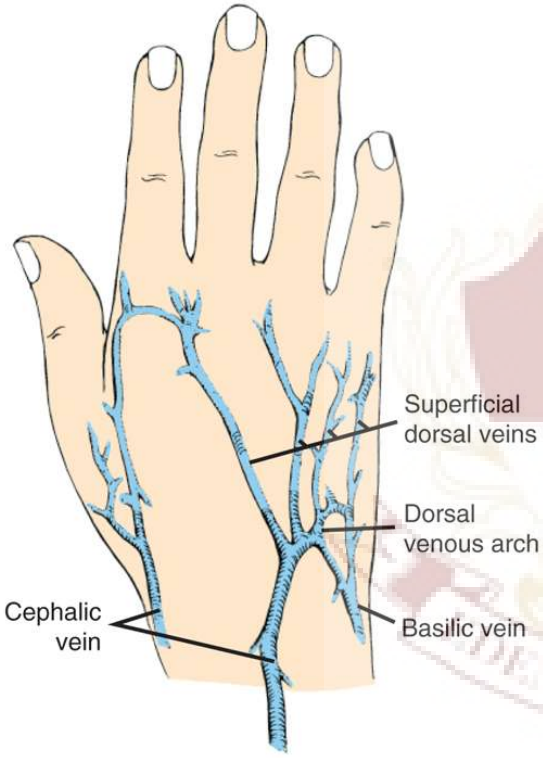
Choosing a Venipuncture Site

- How long does the IV need to stay in?
- How much fluid will need to be pushed through it?
  - More/faster fluids = larger vein
- Will we need to reestablish the IV at another time?
  - New IVs always started more proximal than previous
  - Use most distal site possible
- Can the patient's veins tolerate cannulation at this site?

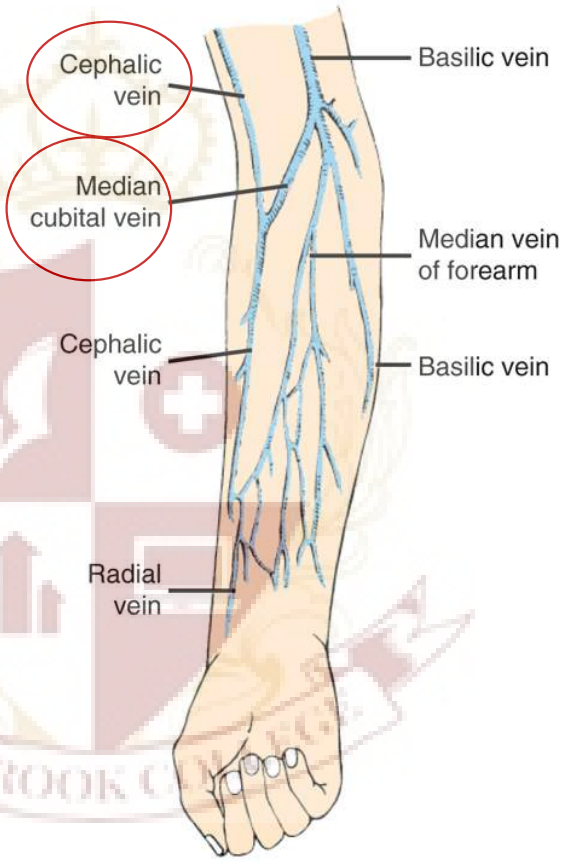
Choosing a Site cont.

- Can be seen and palpated
- At least twice the diameter of the needle/catheter
- Does not bend or curve for at least the length of the needle
- Never start an IV over a joint
- Always in the upper limb unless absolutely necessary
  - IVs in the lower limb are never done on ambulatory patients

Common Venipuncture Sites



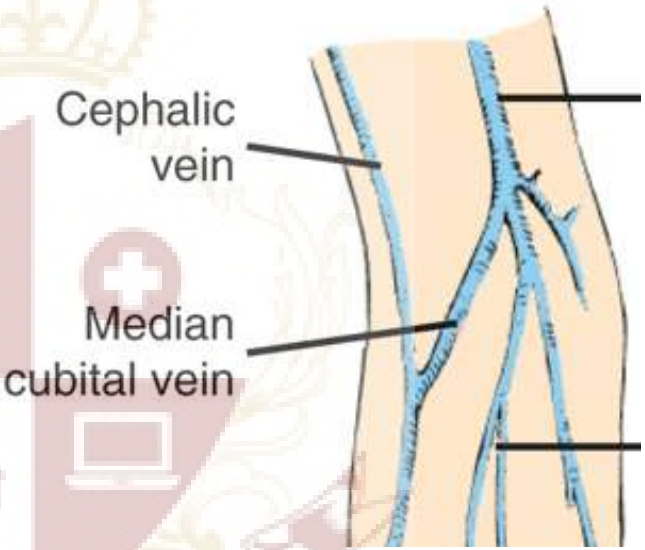
Copyright © 2017 by Elsevier, Inc. All rights reserved.



Copyright © 2017 by Elsevier, Inc. All rights reserved.

Antecubital Vein IV

- Most common choice for contrast admin
  - Large
  - Strong
  - Easily accessed
  - Short term



Before Starting an IV

- Review the requisition

- Follow the "6 Rights Rule"

1. The right **dose**
2. Of the right **medication**
3. To the right **patient**
4. At the right **time**
5. By the right **route**
6. With the right **documentation**

Ehrlich 9th ed. pg 243 Box 14-1

Introducing Yourself to the Patient

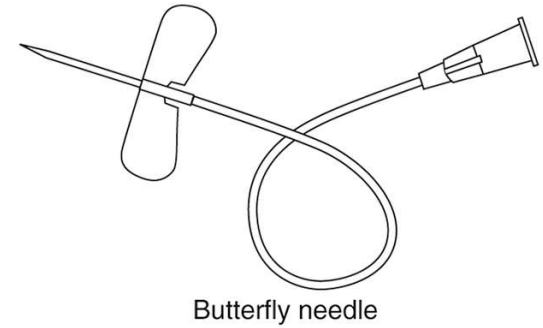
- Similar to gaining informed consent for an injection procedure
  - Consent form signed for administration of contrast or a joint injection doubles as informed consent for IV start.
    - We will be obtaining expressed consent of our "patients" in the lab
- SNOD
  - Student, Name, Occupation, Duty
- Double ID
- Contraindications and Risks

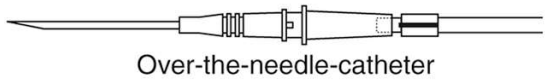
IV Equipment

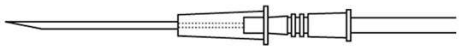
- Gloves
  - Fit tightly (May want to size down)
- Sharps container
  - Yellow with biohazard symbol
  - Puncture resistant
  - Once closed, will not reopen
  - NEVER try to retrieve something from the sharps container
- Needle
  - 18-22G
  - Purpose and vein condition will determine size
  - Faster administration or more viscous fluid = larger needle

Needles

- Butterfly needle
  - No catheter
  - Used to draw blood
  - Not left in pt's body
  - Extension tubing allows movement of syringe without dislodging needle
- Over the needle catheter
  - Soft flexible cannula is left in the arm
  - Angiocatheter
- Straight through the needle
  - Not used in DI


Butterfly needle


Over-the-needle-catheter


Straight-through-the-needle

Copyright © 2018 by Elsevier, Inc. All rights reserved.

Angiocath

- Small plastic catheter surrounding a needle* that punctures skin and vein, and guides catheter into vein
  - Gives "flash" when needle enters vein
  - Gives second "flash" when catheter enters vein
- Push off point on catheter hub
  - One handed insertion
- Button push for needle retraction
  - Cannot be undone!
  - Prevents needle sticks



https://www.wolfmed.com/cath-iv-angio-22gx1-200-cs.html

*Bontrager says needle is solid, but it is not really solid. Has a canal to allow for flash

Tourniquet

- Flexible rubber band
- Restricts venous flow out of arm
- 3-4 inches above desired IV site
- Max 1-2 minutes at once
- One per patient
    - Leading cause of infections from IV starts
- Tight, but not painful
- Tie so tails don't flop onto injection site
- No rolls



https://www.wolfmed.com/tourniquet-latex-free-1000-cs.html

How To Tie a Tourniquet

- https://www.youtube.com/watch?v=RFncdUfaJNg



https://www.bluelight.org/xf/threads/injection-iv-complications-and-info-megathread-faq-iii-vs-i-want-blood.602800/page-11

Equipment cont.

- Extension tubing



https://www.emsstuff.com/saline-flush-prefilled-10ml-syringe/

- Saline flush

https://www.bd.com/en-us/offerings/capabilities/infusion-therapy/iv-administration-sets/iv-extension-sets

- Attach saline to tubing and fill with saline to displace air
  - "priming" the line

Equipment cont.

- Alcohol swabs
- Gauze
- Tape
- Tegaderm
- Blue pads
- Cotton balls or bandaids



https://www.3m.com/3M/en_US/company-us/all-3m-products/~/All-3M-Products/Health-Care/Medical/Tegaderm/?N=5002385+8707795+8707798+8711017+8711738+3294857497&rt=r3

Selecting a Vein

- Non-dominant arm if possible
- Palpate with your non-dominant hand
- Palpate with flat of 2nd and 3rd digit
  - Do not use your thumb
- Look for blue vein under skin
- Should feel spongy or springy
- Takes practice to see and feel

Sites to Avoid

- Hematoma, burns, or other broken skin
  - Painful insertion
- Scars or tattoos
  - Very hard to see veins
- Mastectomy
  - When possible, do not attempt an IV start on the same side as a mastectomy
  - Removal of lymph nodes = fluid build up = difficult IV start

Sites To Avoid cont.

- Sclerosed or hardened veins
  - Disease, inflammation, or scarring
    - Chemotherapy or repeated venipuncture
  - Difficult to penetrate
  - Narrow lumen

- Dialysis shunt
  - Current or recent
  - Excessive scarring and enlarged blood vessels

Starting the IV

- Hand hygiene and put on gloves
  - Do in front of patient to reduce anxiety
- Patient sitting or laying comfortably
  - Arm relaxed at side and on a blue pad
- Apply tourniquet and select site
  - Anchor vein with thumb and landmark injection site
    - Use a marker if necessary
  - Remove tourniquet
- Prepare all equipment for use
  - Open packages
  - Saline on tubing and line primed
  - Gauze and Tegaderm ready
  - Everything in arm's reach

Starting the IV cont.

- Reapply tourniquet and palpate vein
- Clean site with alcohol swab
  - Circular motion starting in center and working out
  - Do not cross over clean site with alcohol swab
  - Allow to dry or it stings patient
- Uncap needle and inspect for damage
- Anchor vein with thumb below site
  - Prevents vein from rolling away

Starting the IV cont.

- Turn needle **bevel up**
  - Hold with thumb and middle finger
  - Index finger is free
- Insert at 20-45º until you see "flash" in the hub of the needle
  - You are now in the vein
- Decrease angle of needle to run parallel to the vein
- Advance another 0.5cm until you see "flash" in the catheter
  - The catheter is now also in the vein

Starting the IV cont.

- With index finger, advance catheter into vein until flush with skin
- Release tourniquet
  - Prevent excessive blood flow for next step
- Optional – place gauze below needle hub
- Occlude vein with fingers of non-dominant hand 1-2 inches above insertion site
- Retract needle and dispose of in sharps
- Attach tubing, aspirate, and flush with saline
  - Hold hub with non-dominant hand to prevent movement

Securing the IV

- If saline flush went smoothly, detach syringe and close lock on tubing
  - Prevents flow of blood into tubing
  - Tubing will be flushed with saline before and after any medication administration
- Place Tegaderm over hub and insertion site
  - Removal of paper strips per site protocol
- Tape tubing in place to prevent pulling
- Write date, time, gauge, and initials on Tegaderm
  - May only be done if IV access will remain beyond duration of the current procedure
- Document in patient file
  - Location, date/time, gauge, flow rate, needle type, and initials

IV Start Video

https://www.youtube.com/watch?v=aq8OwFaIQ4I

This is a great no-nonsense video of how to start an IV smoothly. It is also an excellent demonstration of how a two-handed angiocath needle is used.

The tourniquet tying could use some work....

What If You Miss?

- Next attempt must be more proximal if using the same vessel
- If you aren't successful on your second attempt, ask a colleague to try
  - This is site protocol in many places

Removing an IV

- Hand hygiene
- Close lock on tubing
- Carefully remove Tegaderm
- Hold cotton ball or gauze over injection site
- Remove catheter with one smooth pull
- Check that catheter tip is intact and discard in sharps container
- Apply pressure until bleeding has stopped
- Cover gauze or cotton ball with tape or sterile bandage
- Hand hygiene
- Document discontinued IV

Complications - Hematoma

- Bruise
  - Blood collects under the skin
  - Raised area, red/purple/blue in colour



https://www.medicinenet.com/hematoma/article.htm#can_a_hematoma_resolve_go_away_without_treatment

Hematomas cont.

- Happens when:
  - Needle penetrates both walls of vessel and blood leaks out the bottom
  - Bevel only partially penetrates the vein wall and blood leaks out the top
  - If you puncture the vessel multiple times while "fishing" for the vein
  - The needle is removed from the arm before the tourniquet
  - Insufficient pressure is applied to the site when removing the IV

Hematoma – What To Do

- Some people are prone to hematoma formation
  - Elderly
  - On anticoagulant medication
  - Warn these people to expect a bruise
- Apply pressure for a longer period when removing the IV. Especially if patient is on blood thinners(heparin)
- Apply cool compresses for comfort if hematoma forms
- Usually resolves itself in a few days

Complications - Syncope

- Some people faint at the sight of needles
- Signs
  - Pale and sweating
  - Disorientation
  - Stops talking
  - Swaying or slumping
- Discontinue IV insertion and remove tourniquet
- Prevent patient from falling
- Call for assistance
- If prone to fainting, lay patient down for IV start if at all possible

Complications - Interstitial

- Also called extravasation or infiltration
- IV fluid leaks into the surrounding tissue
  - Swelling around IV site
  - Skin cold to the touch
  - VERY painful
- Catheter tip is not inside vein when fluids are administered
- Flow rate is too high for cannulated vessel
  - Fluids leak through the vessel walls
- Remove IV, apply pressure to prevent hematoma, raise arm, apply cold compress. *BUT always check site protocol****
  - Assure patient the pain is only temporary

Preventing Extravasation

- Choose site with care
  - Vein should be large enough to handle desired flow rate
- Place IV with care
  - Avoid piercing both sides of the vein
  - Watch for catheter flash before advancing completely
- Flush with saline and ensure backflow of blood before administering medication, contrast, or fluids

Post Procedural Complications

- Local or systemic infection
  - Introduction of infection at injection site or into bloodstream
  - Caused by lack of aseptic technique or contamination of equipment
  - Swelling, fever, chills, or discharge from site
- Phlebitis
  - Inflammation of a vein
  - Swelling, redness, or slow/stopped infusion



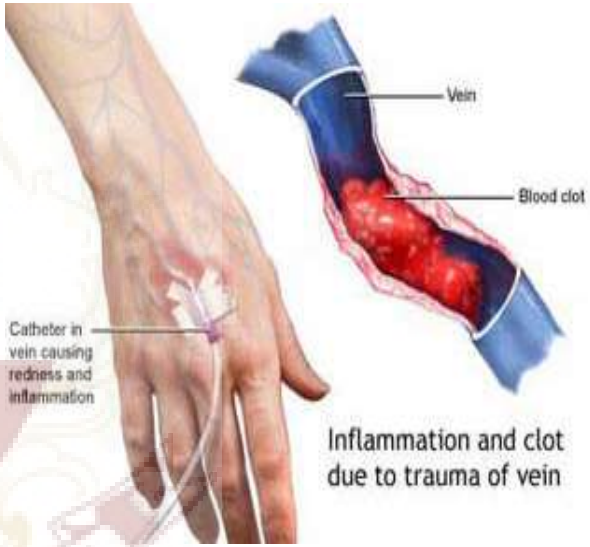
Local infection



Phlebitis

Post Proc Complications cont.

- Thrombosis
  - Clot inside vein
  - Slow/stopped infusion
  - Do not forcibly flush catheter to prevent dislodging the clot



- Air embolus
  - Entry of a bolus of air into the vascular system
  - Complications with as little as 20ml of air (length of an average unprimed IV tube)
  - SOB, chest, shoulder, or low back pain; cyanosis, shock, or cardiac arrest

Key Takeaways

- Choose site with care
- Follow the “6 Rights Rule”
- Assemble equipment beforehand
- Use rigorous asepsis
- Be watchful for complications and know how to respond
- Ask for help when needed