PRE-AND POST- INJECTION TIPS & HEMODYNAMIC FLOW OF DYE

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Today’s Outline

• Philosophy/Legality
• Venous Anatomy
• Hemo-dynamics/Circulatory System
• IV Tray Preparation
• Basic Venipuncture Techniques
• Side Effects/Contraindications

Venipuncture is NOT for everyone

• Proper training
• Co-ordination
• Experience
• First Aid
• CPR certified
• Willingness/Attitude
• Confidence

Why Do Injections Yourself?

• Speed and Efficiency
• Patient Communication Simplification
• Some work better alone…and patients prefer the solo approach more so than the 2 pronged approach…
• Job Security / Increased Skill Set
• Time Consuming (0-30 minute waits + the procedure itself)
• Patient-Photographer-Nurse Communication Problems
• Over Complicating a Simple Procedure
• Costs/Labor Hours $$$

Legality

• Up to your state and your lawyer’s interpretation, guidance and recommendations

• Not up to you or the photographer across town…(a photographer’s legal opinion = 0)
• Not up to your web search findings
• Not up to minority/majority opinion
• Not up to the OPS
Pre-and post Injection Tips and
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For What It’s Worth

“We are here to share our experience in the art of venipuncture pertaining to retinal imaging. By doing so, in no way are we encouraging photographers to perform their own injections without proper institutional approval, training, certification, oversight and insurance coverage in states where it is not legal to do so.”

Paul Paquette                          Kirsten Locke

Physician Supervision

As Defined by Medicare

- **General:** Under physicians overall direction, presence on-site not required but still his ultimate responsibility
- **Direct:** Physician in office during procedure
- **Personal:** Physician in room during procedure

INJECTION: Forcing of a fluid into a vessel or cavity or under the skin
VENIPUNCTURE: Puncture of a vein for any purpose
PHLEBOTOMY: Surgical opening of a vein to withdraw blood (Phlebotomus: Blood sucking “Sandfly” insect)

Taber’s Medical Dictionary

What is Blood?

- **PLASMA (55%)**
  - 90% water, 10% Solutes
    - Proteins: albumen, antibodies, fibrinogen
    - Nutrients: carbohydrates, glucose, lipids, fats, cholesterol
    - Minerals (Na, K, Ca, Mg)
    - Gases: O₂, CO₂, N₂
    - Other Substances: vitamins, hormones, urea, creatinine, uric acid
- **FORMED ELEMENTS (45%)**
  - Red Blood Cells
  - White Blood Cells
  - Platelets
  - Blood Volume = 5.3 quarts

What it does?

- Transport through the body of:
  - oxygen and carbon dioxide
  - food molecules (glucose, lipids, amino acids)
  - ions (Na⁺, Ca²⁺, HCO₃⁻)
  - wastes (urea)
  - hormones
  - heat
- Defense of the body
  - against infections
  - foreign materials.
  - All the WBCs participate in these defenses.
Artery vs Vein

Artery: Brings blood FROM the heart.
- Arteries have thicker walls and tend to have narrower lumens. They have to constrict and dilate to control how much blood flows where, and they must bear the powerful force generated by the heart.

Vein: Brings blood TO the heart
- Veins have thinner walls and tend to have wider lumens. They have to store blood, and need muscle only to push the blood back to the heart.

Vein Valves

- Open one way only
- Pumping Devices pushing blood to heart
- Prevents backflow
- Raised bumps under the skin

Stick Sites

In order of Preference
1. Antecubital Fossa; (Basillic, Medial, Cephalic)
2. Dorsals
3. Radials (can be painful due to nerve location). Last resort.

What is a Butterfly Needle?

- Hollow Blade
- Silicone Coated
- Laser Cut
- Grip Wings
- Tip, Bevel, Shaft, Lumen
- Screw Connection/Multi-Sample Connection

Butterfly Gauges

- 21g: Antecubital Fossa, blood drawing
- 23g: AC, Top of Hand, Small Veins
- 25g: Top of Hand/Children
- 27g or 30g: Tiny veins, inject right away to avoid coagulation w/in needle lumen.

Note: needle gauges numbers:
- smaller number = thicker needle
- larger number = thinner needle

- Keep tourniquet high on arm
- Inject slowly
- Start timer with removal of tourniquet
What is Fluorescein Sodium?

- Isobenzofuran, xanthene, dihydroxy, disodium salt
- Sterile Solution in Water
- Grows at blood pH 7.4
- A petroleum derivative (coal tar), not a “Vegetable Dye”

Where Does the Dye Go?

Systemic Circulation

1. Syringe
2. Tubing
3. Butterfly Needle
4. Vein Lumen
5. Vena Cava
6. Right Atrium
7. Tricuspid Valve
8. Right Ventricle
9. Pulmonary Valve
10. Pulmonary Arteries-
11. Lungs (CO₂ drop, Oxygen pick-up)
12. Pulmonary Veins+
13. Left Atrium
14. Bicuspid Valve
15. Left Ventricle
16. Aortic Valve
17. Aorta
18. Arteries
19. Arterioles/Capillaries
20. Tissue (retina)
21. Veins
22. Veins (to original IV site)
23. Vena Cava…

Retinal Circulation

- 1a. Cilioretinal Artery (if any, 1:7)
- 1b. Choroidal Vessels
- 2. Central Retinal Artery
- 3. Sup./Inf. Retinal Arteries
- 4. Arterioles/Capillaries
- 5. Venules
- 6. Veins
- 7. Central Retinal Vein
- 8. Recirculation

Contraindications/Precautions

- Hypersensitivity to FlNa-Previous reaction
- Gen’l Health/Cardiac status,
Allergies, Asthma
- Pregnancy
- Nursing (wait 2 days to
breast feed again)
- Blood Thinners/Aspirin
- Allergies to
Diphenhydramine, Atropine
or Epinephrine…
- Mastectomy
- Lymph Nodectomy
- Shunt/Porta-caits (VAD)
- Previous Cutdown/Scars
- Tattoos

Off Limits

- Mastectomy Hemisphere:
  or least-recent surgery
  side. If double, either
side.
- Scar Tissue/Burns Sites
- Vascular Access Device
(VAD)/Indwelling Lines:
these require special
circumstances/training
- “Track Marks”
- Tattoos (Homemade
tattoos rule you out for
organ donation)

Don’t assume you have permission to use VADs
Vital Signs

- BP, Pulse Rate, Respirations and Pain
- 180/100 Maximum allowable BP unless approved by physician
- Before and After Angiogram (auto-cuff!)
- Normal Adult Pulse Rate is 72
- Chart clearly and legibly

OSHA/Universal Precautions

- Written guidelines on handling “Bloodborne Pathogens” in every facility
- Good hand washing technique
- Proper use & disposal of needles
- Proper use & disposal of gloves & other protective equipment & soiled materials
- Maintain sterile technique

Drawing Up The Dye

- Wash hands
- Draw up before pt enters room
- Vials (rubber top)-inject air for back pressure
- Ampules- snap top off, use filter needle, no air injected
- Recap needle (open method)
- Attach syringe to (optional stopcock &) butterfly
- Discard needle (closed Method)

Dosage & Administration

- 10% Fluorescein Sodium (FlNa)
  - Adults: 5cc (500mg) injected rapidly
  - Child: .035cc/lb body weight injected rapidly
    (50 lbs =1.75cc, 100 lbs =3.5cc, 143+lbs =5cc)
- 25% FlNa
  - Adults: 2cc (500mg) injected rapidly
  - Child: .02cc/lb body weight injected rapidly
    (50 lbs = 1cc, 100+lbs = 2cc)

Pre-Injection Supplies

- IV Tray/Kit
- Tape
- Gloves
- Armboard
- Tourniquet
- 1 large trash can (reg. Trash)
- 1 small red lined trash can
- Sharps Containers
- Emergency (Crash) kit

Position the Patient

- Chin & head in headrest
- Arm on armboard
- Doughnut of light on closed eyelid
- Strip of tape stuck to tray or camera
- IV tray next to arm of choice
- Small trash can on opposite side
Pre-and post Injection Tips and Hemodynamic Flow of Dye

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Position
Photographer/Venipuncturist

- On rolling stool
- Lock camera with light on eyelid
- Select proper filters & flash modes, set timer
- Move to side with pt’s arm
- Near light switch, Lg trash can & sharps bucket

Prep the Venipuncture Site

- Wash hands
- Apply Turniquet 3-4” above preferred site
- Open & close the hand several times
- Lower arm below heart level
- Gentle “snapping” of selected vein
- Warm compress
- Patient to drink plenty of water

Palpate the Site

- Straighten the arm- do not hyperextend
- Palpate vein as patient keeps closed fist
- Alcohol site
- Glove up

The Stick

- Firm up the vein
  - Place thump 1-2” below site
  - Draw loose skin & “rolling” vein distally
- BEVEL UP!!!
- 5-15 degree angle
- Firm, quick jab, careful not to perforate
- Release tourniquet
- Patient opens hand

Closed Butterfly Method

- Attach butterfly to syringe
- Push dye thru tubing, leave approx. 1” air
- Prep & palpate site as above
- Small “flash” of blood at end of tubing or...
- Need to draw back on syringe
- Release tourniquet
- Patient opens hand

Open Butterfly Method

- Do not attach syringe to butterfly
- Discard syringe needle
- Prep & palpate site as above
- Quick return assures proper needle placement
- Release tourniquet
- Patient opens hand
- Attach syringe/stopcock to butterfly as blood approaches end of tubing
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Arterial Injection

- Bright red blood, not dark, quicker return, pulsing can be seen in IV tubing most times...
- Extremely Painful
- Must notify MD right away
- May require ER trip, pain meds
- Don’t DO IT!

Infiltration/Hematoma
(Technique-Preventable)

Putting It Together

- Color photos, Red Frees
- Palpate, stick
- Release tourniquet*
- Tape butterfly* *optional

• Simultaneously push dye & start timer
• Watch for infiltration
• Turn room lights off, eye to eyepiece, feel for infiltration
• Shoot, shoot, shoot…
• Remove needle while waiting for late phase

Removal

- Avoid excessive movement of needle, pull straight out away from 2nd hand
- Apply bandage & pressure
- Dispose of needle in easy access sharps bucket

Side Effects

- Yellow-green urine color, 1-2 days
- Yellow skin color, 2-3 hours

THAT’S IT!!

Sharps Containers

- The Bigger, the Better
- Use Gravity: Drop In, Don’t Force
- Don’t Clip Needles
- Don’t Recap Needles
- Use Safety Retractors
- Don’t Overfill

Proper Disposal

- Sharps Container-needles, syringes, glass shards
- Red bag trash can- gloves & soiled bandages, alcohol pads & other disposables
- Regular trash can-paper, wrappers & non-soiled disposables

“Possible” Adverse Reactions

Rosario Bate, RN, CRA, COT

- TECHNIQUE (Preventable?)
  - Infiltration/Extravasation (“blown or popped” vein)
  - Hematoma
  - Arterial Injection
  - Inflammation/Septacemia
  - Necrosis
  - Nerve Palsy/Damage (hit a nerve)

- SYSTEMIC
  - Nausea*/Vomit (puke, barf, hurl…)
  - Sneezing
  - Urticaria (hives, skin eruptions)
  - Pruritis (Itching)
  - Thrombophlebitis (blood clotting)
  - Syncope* (fainting)
  - Pyrexia (fever)
  - Respiratory/Anaphylaxis
  - Cardiac/Shock
  - Death

(Red lights patient sees is due to bright flash)
Emergency Procedures

- Have a system in place and practice
- Have #s posted in logical places
- Have easy access to Crash Cart
- Do your pre-injection vitals and charting before you have to react to an emergency situation that may not have happened if you had done your job correctly…

Adverse Reaction-Systemic (Severe)

Prevention:
- Respiratory/Anaphylaxis: None
- Cardiac/Shock: None
- Death: None
- Note previously listed contraindications!!
- BE PREPARED!
  - Oxygen
  - Crash Cart
  - Emergency Plan
  - Know CPR

Crash Cart Meds

- Banyan Kit (varies w/costs)
- Epinephrine, Diphenhydramine (Benadryl IM and Oral)
- Atropine
- NitroGlycerin Capsules
- Lactated Ringers, Saline, Sodium Chloride
- Ice Packs (chem-ice)

Crash Cart Tools

- Epi-Pens
- Laryngoscope, Ambu-Bag/Airway Tubes
- CPR Mask/tube
- Needles/Syringes/IV Catheters
- Heart Defibrillator (if available)

Premedication Alternatives*

- Diphenhydramine (Benadryl): antihistamine, prevent or reduce mild allergic reactions like hives, itching
- Compazine, Phenergan: prevent or reduce nausea, vomiting
- Benadryl/Zantac/Prednisone: prevent major allergic reactions, including anaphylaxis

*...as prescribed by the requesting MD...