COI Disclosure Statement

There are no financial relationships or conflicts of interest to disclose with this presentation.

Outline
- Intravenous Contrast Media Basics
- Risks Associated With Contrast Media
- Allergic Reaction
- Extravasation
- Air Embolism
- Contrast-Induced Nephropathy
- Other Risk Factors
- Conclusion

Intravenous Contrast Media: Basics
- Improves visualization of anatomy in medical imaging
- Adverse effects range from mild to life-threatening
- Preparation for a quick response is key
- 20 hour clearance with normal renal function
- Repeat doses within 24 hours should be avoided

Advantages
- Generally Safe
- Better Visualization of Anatomy
- Detect Abnormalities
- Aids in Diagnosis and Treatment
- Aids in Dialysis Access Salvage
- Can Be Life-Saving

Disadvantages
- Allergic Reactions
- Extravasation
- Air Embolism
- Contrast-induced Nephropathy


Contrast Filled Vessel
Different Types of IV Contrast Media

- Ionic High-osmolar
  - Oldest Agent
- Ionic Low-osmolar
  - Less Painful
  - Less Toxic
  - Fewer Side Effects
- Non-ionic Low-osmolar
  - Less Painful
  - Less Toxic
  - Fewer Side Effects
- Iso-osmolar
  - Most Recent Nonionic Agent
  - Same Osmolality As Blood
  - Visipaque Only Iso-osmolar

Four Major Properties of IV Contrast

- Osmolality: Number of particles in a solution
- Viscosity: Thickness of agent
- Strength: Amount of iodine concentration
- Toxicity: How toxic or nontoxic agent is

Injection of Contrast

- Radiologist (Interventional Nephrologist), radiologic technologist, or registered nurse may administer contrast media
- Stable IV necessary
- Proper technique
- Communicate with patient and monitoring of site
- Avoid mixing blood with contrast

In case of emergency

- Pre-arranged Responses
- Trained Personnel
- Equipment
- Medications Must Be Available

Adverse Reactions

- Adverse reactions are not common
- Knowledge of:
  - Side effects
  - Pre-existing conditions
  - Treatment
- Pre testing skin with contrast media may be dangerous, is not predictive of adverse reaction and is not recommended

Risks Associated With Contrast Media

- Allergic Reaction
- Extravasation
- Air Embolism
- Contrast-Induced Nephropathy
**Allergic Reactions**

- Mild
- Moderate
- Severe
- Delayed

**Allergic Reaction: Mild**

- Do not typically require medical treatment
- Monitor 20 to 30 minutes to ensure recovery
- Treat symptoms if necessary

- Nausea
- Vomiting
- Warmth Sensation
- Flushing
- Pain at injection site
- Urticaria
- Hives
- Scratchy throat
- Tongue/Facial swelling
- Sneezing

**Allergic Reaction: Moderate**

- Abort case
- Initially not life-threatening
- Often requires medical treatment
- Requires close monitoring
- ACLS protocol if necessary

- Severe urticaria/erythema
- Bronchospasms
- Moderate tongue/facial swelling
- Hypotension with tachycardia
- Significant vasovagal reactions

**Allergic Reaction: Severe**

- Abort case
- Call response team or 911
- ACLS protocol
- May be life-threatening
- Requires prompt recognition and treatment
- Most severe allergic reactions require epinephrine

- Altered mental status
- Respiratory distress
- Diffuse erythema
- Severe hypotension
- Sudden cardiac arrest
- Complete cardiopulmonary collapse

**Allergic Reaction: Delayed**

- May occur from 30 to 60 minutes up to one week following injection
- Most occur between 3 hours and 2 days
- Severe skin reactions have been documented in patients with systemic lupus

**Allergic Reaction: Prevention**

- Indicated for patients “at risk”
- Osmolality and complexity of the molecule of contrast agents influence likelihood of reactions
- Associated with release of histamine from basophils and mast cells
- IV steroids not effective when given less than 4-6 hours before injection
Elective Premedication

- Prednisone 50 mg PO 13 hours, 7 hours, and 1 hour before injection
- Benadryl® 50 mg IV, IM, or PO 1 hour before injection

Emergency Premedication

- Is it a TRUE emergency??? If the procedure can't wait...
- Option 1 (Most desired option)
  - Hydrocortisone 200 mg IV q4h until contrast is given
  - Benadryl® 50 mg IV given 1 hour prior to contrast injection
- Option 2 (Preferred for asthmatic patients with known allergy to methylprednisolone, aspirin, or NSAIDs)
  - Dexamethasone 7.5 mg IV q4h until contrast is given
  - Benadryl® 50 mg IV given 1 hour prior to contrast injection
- Option 3 (Preferred if ordered less than 4-6 hours prior to procedure)
  - Benadryl® 50 mg IV given 1 hour prior to contrast injection

Allergic Reaction: Risk Factors

- History of a prior allergic reaction
- Shellfish or seafood allergy is unreliable
- No increased risk for topical iodine allergies
- Asthma
- Renal Insufficiency
- Cardiac Status
- Anxiety

Extravasation

- Can occur during hand or power injection
- Toxic to surrounding tissue
- Peaks 24 to 48 hours
- Tissue injury related to the hyper-osmolality of the fluid
- Usually no permanent injury

Extravasation: Complications

- Compartment Syndrome
- Mechanical compression
- Skin ulceration and tissue necrosis

Extravasation: Treatment

- No consensus on treatment
- Elevation of affected extremity to promote re-absorption
- No clear evidence on warm vs. cold compresses
- Surgical consult for severe injury
Air Embolism

- Potentially fatal, but rare
- Silent venous air embolism commonly occurs by hand injection
- May occur if care is not taken during power injection
- May result in air hunger, dyspnea, cough, chest pain, pulmonary edema, tachycardia, hypotension, expiratory wheezing, stroke

Air Embolism: Treatment

- 100% O2
- Place patient in left lateral decubitus position
- Hyperbaric oxygen may be beneficial
- CPR if needed

Contrast-Induced Nephropathy (CIN)

- Sudden deterioration in renal function following injection of contrast medium
- Factors include renal vasoconstriction and direct tubular toxicity
- Hydration and diluting contrast medium are key in preventing CIN

Contrast-Induced Nephropathy (CIN): Risk Factors

- Pre-existing renal insufficiency
- Diabetes
- Dehydration
- Cardiovascular disease
- Diuretic Use
- Advanced Age
- Multiple Myeloma
- Hypertension
- Hyperuricemia
- Repeat Contrast Use

Contrast-Induced Nephropathy (CIN): Prevention

**Adequate hydration is the gold standard in preventing CIN
- Mucomyst use is controversial
- Avoidance of Contrast
- Other imaging modalities
- Ultrasound or non-contrast CT or MRI
Other risk factors
- Multiple myeloma
- Age
- Use of beta-adrenergic blocking agents
- Sickle cell disease
- Hyperthyroidism or other thyroid disease

Conclusions:
- Benefit must outweigh the risk
- Use of contrast is patient and indication appropriate
- Take steps to prevent adverse reactions
- Be prepared to treat adverse reactions with trained personnel and equipment