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MANAGEMENT OF CT CONTRAST AGENT - INDUCED ADRs

US FDA REGISTERED API
ASSURED QUALITY

PATIENT SELECTION AND PREPARATION[1]

Assess Medical History

Common Factors that Increase the Risk of Contrast Reactions

Factor	Associated Predisposing Characteristic
Age	Infants and adults over 60 years
Sex	Higher risk in females than males
Underlying medical conditions	Asthma, heart disease, dehydration, renal disease, diabetes
Hematologic conditions	Myeloma, sickle cell disease, polycythemia
Medications	NSAIDs, IL-2, β-blockers, biguanides
Contrast-related	Iodine dose >20 mg, rapid injection rate, intra- arterial administration, prior contrast reactions

NSAIDs = Nonsteroidal antiinflammatory drugs; IL-2 = Interleukin-2.

- Explaining the procedure step-by- step to patients
- Calibrate the devices in advance
- All air leaks and bubbles should be removed
- The bore of the catheter should be chosen based on the contrast injection rate tested with a saline bolus right before injection

PREMEDICATION PROTOCOL[1]

Premedication is recommended for patients needing IV contrast who have a history of prior reactions

Premedication Protocols for Patients with a History or Higher Risk of Contrast Reactions

Premedication	Recommended Protocol
Corticosteroids (choose one of the following)	Prednisone - 50 mg orally at 13, 7 and 1 hour before contrast administration
	Hydrocortisone - 200 mg intravenously 1 hour before contrast administration
	Methylprednisone - 32 mg orally at 12 and 2 hours before contrast administration
Antihistamine	Diphenhydramine - 50 mg administered orally, intramuscularly or intravenously 1 hour before contrast administration

- Patients with shellfish allergies have a higher risk of contrast reactions, likely due to cross-reactivity with contrast media
- Steroid premedication is not recommended for patients with active tuberculosis, diabetes mellitus, peptic ulcer disease, acute lymphoblastic leukemia or non- Hodgkin's lymphoma

GENERAL PRINCIPLES FOR MANAGING CT CONTRAST AGENT REACTIONS[1]

A
- Assessment (severity and category of reaction) - BP, Pulse monitoring, ECG monitor to evaluate cardiac rhythm
- Assistance (call for it)
- Airway, oxygen
- Access (venous) - secure IV lines

B
- Breathing (begin CPR if necessary, bag - valve mask or mouth mask)
- Beware of paradoxical responses (e.g., β-blockers may prevent tachycardia response)

C
- Categorize reaction and patient status
- Circulatory assistance, intravenous fluids
- Call cardiopulmonary arrest response team if necessary
- Cardiac output assessment, decreased venous return

D
- Drugs: dose and route, do not delay
- Do monitor, assess and reassure patients

MANAGEMENT OF COMMON CT CONTRAST AGENT REACTIONS[1]

ANAPHYLACTOID REACTIONS

REACTION	MONITOR	TREATMENT
Urticaria (skin rash)	Initial size with marking and follow	Usually none; **diphenhydramine**, 25-50 mg orally/ intramuscularly/ intravenously; **epinephrine** (1:1,000), 0.1-0.3 mL subcutaneously/intramuscularly
Bronchospasm	Oxygen saturation, pulse, BP	Secure airway; oxygen, 6-10 L/min; **metaproterenol / terbutaline inhaler**, 2-3 puffs; **epinephrine** (1:1,000), 0.1-0.3 mL subcutaneously/ intramuscularly; **epinephrine** (1:10,000), 1 mL intravenously (slowly) if hypotensive; call the emergency medical team
Facial or laryngeal edema	Oxygen saturation, pulse, BP	Secure airway; oxygen, 6-10 L/min; call the emergency medical team if severe; **epinephrine** (1:1000), 0.1-0.3 mL subcutaneously/intramuscularly; **epinephrine** (1:10,000), 1 mL intravenously (slowly) if hypotensive; call the emergency medical team
Hypotension and tachycardia (fast pulse)	Oxygen saturation, pulse, BP	Elevate legs 60°; oxygen, 6-10 L/min; rapid intravenous fluids; **epinephrine** (1:10,000), 1 mL intravenously (slowly); call the emergency medical team
Hypotension and bradycardia (slow pulse)	Oxygen saturation, pulse, BP	Elevate legs 60°; oxygen, 6-10 L/min; **atropine**, 0.6-1 mg intravenously (slowly); repeat to total of 2-3 mg (0.04 mg/kg) if needed; call the emergency medical team

NON - ANAPHYLACTOID REACTIONS

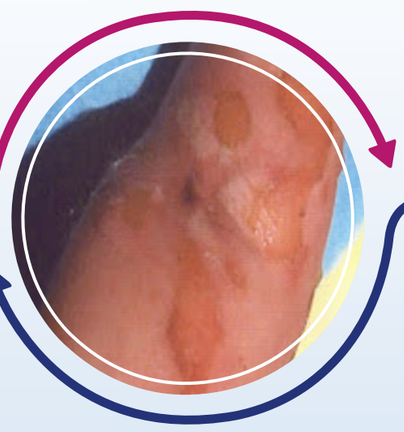
REACTION	MONITOR	TREATMENT
Cardiac arrhythmia	Oxygen saturation, pulse, BP, ECG	Follow **ACLS* protocols**; call the emergency medical team *Advanced Cardiovascular Life Support
Hypertension	Oxygen saturation, pulse, BP, ECG	**Nitroglycerine**, 0.4 mg sublingually; nitroglycerine; 2% ointment; **phentolamine**, 5 mg intravenously for **pheochromocytoma**; call the emergency medical team
Seizures	Oxygen saturation, pulse, BP, ECG	Secure airway; oxygen, 6-10 L/min; **diazepam**, 5 mg intramuscularly/ intravenously; **midazolam**, 0.5-1 mg intravenously; **phenytoin infusion**, 15-18 mg/kg at 50 mg/min; call the emergency medical team
Pulmonary edema	Oxygen saturation, pulse, BP, ECG	Secure airway; oxygen, 6-10 L/min; **furosemide**, 20-40 mg intravenously (slowly); **morphine**, 1-3 mg intravenously; call the emergency medical team

All medications are to be administered under physician supervision

EXTRAVASATION[1]

EXTRAVASATION

- Contrast agent leakage from blood vessels into surrounding tissue during injection can cause local inflammation, usually without serious effects for smaller volumes
- Larger volumes (50-75 ml) may lead to tissue damage due to chemotoxicity, accompanied by persistent burning and swelling at the injection site



MANAGEMENT

- Assess patient's pulse distal to the injection site
- Documenting initial swelling and erythema
- Manage smaller extravasations with elevation and cold compresses
- For persistent swelling, pain or discolouration, consult a surgeon

ADDITIONAL CAUTION ON METFORMIN DRUG[2]

Metformin is a Type 2 diabetes drug which increases insulin sensitivity and reduces liver glucose production

Patients who experience AKI, while using metformin may have an increased susceptibility to developing lactic acidosis

Risk with Iodinated Contrast

Contrast - induced kidney injury reduces Metformin clearance | Lactic acid buildup → Blood becomes acidic (Metabolic Acidosis) | May lead to organ damage, shock & coma

WHEN TO AVOID METFORMIN?

- No signs of AKI
- eGFR - 30 mL/ min/ 1.73 m^2 or higher

Can continue metformin before/ after IV ICM

- Suspend metformin in AKI/ severe CKD

Stop - 48 hrs, resume after checking the renal function

References:
1) Iodinated Contrast Media and Their Adverse Reactions, Journal of Nuclear Medicine Technology, Vol. 36, No. 2, June 2008.
2) ACR Manual on Contrast Media, 2024, 44-45.

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