County of Los Angeles **Department of Health Services**

VALLEYCARE
OLIVE VIEW-UCLA MEDICAL CENTER/HEALTH CENTERS
POLICY & PROCEDURE

NUMBER: 250
VERSION: 6

SUBJECT/TITLE: **USE OF CONTRAST AGENTS IN IMAGING STUDIES**

POLICY: Olive View-UCLA Medical Center shall have a standardized procedure for use of contrast in imaging studies.

PURPOSE: To standardize a protocol for procurement and storage of contrast material, ordering and administration of contrast material, and management of contrast allergy prophylaxis, contrast reactions, and contrast contraindications.

DEPARTMENTS: All

DEFINITIONS:

PROCEDURE:

I. PROCUREMENT AND STORAGE OF IODINATED CONTRAST MATERIAL

a. Contrast material is ordered by the Department of Radiology
b. Contrast material is received by pharmacy and a copy of invoices is maintained by pharmacy.
c. Contrast material is stored in locked cabinets and only accessible by technologists.
d. A log of contrast material intake and distribution to department sections is provided to pharmacy on a weekly basis.
e. Contrast bottle serial number is recorded in the CT log book at the time of injection to maintain a record of dose tracking

II. ORDERING

a. Referring provider orders the appropriate imaging procedure in Cerner (ORCHID) or through the eConsult system.
b. Referring provider notes the precautions for young women and for pregnant and nursing mothers.
c. Referring provider notes any history of adverse reaction (allergy) to contrast agents or other conditions (e.g. renal disease) which might prohibit IV contrast administration. If present, referring provider should obtain proper history and severity of allergic reaction, counsel the patient, and provide prescription order for contrast allergy prophylaxis (attachment 3). If needed, the request may be discussed with the Radiologist prior to ordering.

III. POST CONTRAST ACUTE KIDNEY INJURY (PCAKI) AND MEDICATION INTERACTIONS

a. Referring physician orders serum creatinine/eGFR to assess for underlying medical renal disease within 30 days prior to intravascular (IV) iodinated contrast injection only in at-risk patients. Risk factors for PCAKI that warrant renal function screening include:
    i. Age > 60
    ii. History of renal disease, including:
        1. Dialysis
        2. Kidney transplant
        3. Single kidney
        4. Renal cancer
        5. Renal surgery
    iii. History of hypertension requiring medical therapy
    iv. History of diabetes mellitus
    v. History of heart failure with reduced ejection fraction
    vi. History of cirrhosis
    vii. Metformin or metformin-containing drug combinations
b. Estimated GFR (eGFR) is used to risk stratify for potential PCAKI, and contrast dose is determined by eGFR per standard protocol.
c. Hydration – All patients should be properly hydrated prior to and following IV contrast CT exams to decrease the risk of PCAKI. This is particularly important in all patients referred from the Urgent Care or Emergency Department with a recent history of poor oral intake.
d. Follow up of renal function post contrast administration is at the discretion of the referring clinician.
e. Metformin is to be held for patients with decreased renal function (eGFR <30 mL/min/1.73m^2) following contrast administration and will be restarted per referring clinician after follow up assessment of renal function.
f. Other medications will not be routinely discontinued prior to IV contrast use, as the risks of temporarily discontinuing other medications are felt to outweigh the rare potential for interaction with contrast media.
g. IV contrast dose for CT is to be administered by standard protocol

IV. NEPHROGENIC SYSTEMIC FIBROSIS (NSF)

a. Referring physician orders serum creatinine/eGFR to assess for underlying medical renal disease within 30 days (outpatients) or 2 days (inpatients) prior to gadolinium based contrast injection only in patients at-risk for NSF. Risk factors for NSF that warrant renal function screening include:
    i. History of renal disease, including:
        1. Kidney transplant
        2. Single kidney
        3. Renal cancer
        4. Renal surgery
    ii. History of hypertension requiring medical therapy
    iii. History of diabetes mellitus

iv. History of heart failure with reduced ejection fraction
v. History of cirrhosis

b. Dialysis: Dialysis (of any form) is considered a relative contraindication to using ACR Manual Group II and Group III agents (defined below) and an absolute contraindication to using Group I agents. Any gadolinium-based contrast administration in dialysis patients should only be used when the benefits to contrast administration outweigh the risks and following a documented discussion of the risks and benefits by the referring clinician with the patient or patient representative.

c. **ACR Manual Group II Agents** (agents with few, if any, unconfounded cases of NSF) **and Group III Agents** (agents for which data remains limited regarding NSF risk, but for which few, if any, unconfounded cases of NSF have been reported) **should be avoided when possible if eGFR <30**, and, if the eGFR <30 should only be used when benefits outweigh risks to contrast administration and following a discussion with the patient or patient representative
   i. Gadobutrol dimeglumine (MultiHance)
   ii. Gadbutrol (Gadavist)
   iii. Gadoterate acid (Dotarem)
   iv. Gadoteridol (ProHance)
   v. Gadoxetate disodium (Eovist)

d. ACR Manual Group I Agents (agents associated with the greatest number of NSF cases) should NOT be used.
   i. Gadodiamide (Omniscan)
   ii. Gadopentate dimeglumine (Magnevist)
   iii. Gadoversetamide (OptiMARK)

e. IV contrast dose for MRI is to be administered by standard protocol

V. ULTRASOUND CONTRAST MEDIA

a. Ultrasound contrast agents are generally considered safe and are not contraindicated with renal impairment or considered nephrotoxic. In pregnant patients, the agents should only be used when needed and when the benefits outweigh any potential small risk to the fetus.
b. Ultrasound contrast agents are stored in pharmacy and ordered by the radiologist on a case-by-case basis, as needed.
c. Ultrasound contrast agents are administered by the radiologist.

VI. CONSENT

a. Consent for imaging with or without a diagnostic agent is included in the general hospital consent form. .
b. If diagnostic imaging with iodinated or gadolinium-based contrast material is needed in a patient whose eGFR<30, radiology will proceed with the examination following written documentation in the patient's medical record by the referring provider that the risks and benefits of the procedure were discussed with the patient or patient representative.

VII. ADMINISTRATION

a. All inpatient and outpatient radiology requests will be evaluated by a Radiologist prior to scanning and assigned a departmental protocol for contrast administration. Emergency Department orders will act as a protocol, and these examinations will not be routinely be assessed by a Radiologist prior to scanning in order to avoid delays in patient care.
b. All patients will complete a patient questionnaire to assess for contraindications to contrast administration. Questionnaire will be scanned into PACS at the time of the examination and retrospectively reviewed by the Radiologist.
c. Contrast doses and routes of administration will be in accordance with standard department protocol (attachment 1). Reduced dose contrast will be used when the eGFR is known to be less than 45. Contrast administration when the eGFR is < 30 is relatively contraindicated, and, if needed, should only be administered following documentation of the risks and benefits (see VI. b.) When needed, oral contrast will be administered by staff as determined by the patient's service of origin, as follows:
    i. ER/Urgent Care: ER/Urgent Care nursing staff
    ii. Inpatient wards: Inpatient unit nursing staff
    iii. Outpatients: Radiology Nurse or Technologist
d. IV access: Appropriate IV access should be obtained for power injector use (attachment 2)
    i. For inpatient, Emergency Department, and Urgent Care patients, IV access should be obtained by floor staff prior to the patient arriving at the CT suite.
    ii. For outpatients, IV access will be obtained by Radiology Nursing Staff. Radiology Technologists can also obtain IV access, provided they have been certified to perform venipuncture from a program accredited by the American Society of Radiologic Technologists. Documentation of certification is kept with the technologists' personnel file.
e. Contrast administration: All IV contrast is administered by a Radiologist or Radiologic technologist.
f. Licensed Individual Practitioner (LIP) is responsible for IV contrast administration
    i. The LIP responsible for IV contrast administration will be the in-house radiologist.
    ii. During off hours when no in-house radiologist is available, the LIP for IV contrast administration will be the primary in-house physician.
    iii. During off hours when no in-house radiologist is available, for emergencies regarding contrast administration, the “Code Team” will be activated.
    iv. During off hours when no in-house radiologist is available, and the primary physician is not in house, the LIP for IV contrast administration will be the DEM Attending on duty.

VIII. ADVERSE REACTION TO CONTRAST MATERIAL

a. If a patient is identified as having a history of allergic reaction to contrast material, following precautions will be taken prior to administering intravascular contrast agents:
    i. For history of idiosyncratic (physiologic) reactions (eg nausea, restlessness, sweating), premedication will not be routinely given.

ii. For history of mild or moderate allergic-like reactions (eg itchiness and urticaria), routine premedication should be ordered by the referring physician in accordance with the Radiology protocol (attachment 3).
iii. For history of severe reactions (eg bronchospasm, laryngeal edema, circulatory collapse), IV contrast should be avoided if possible, and alternate imaging modalities or noncontrast examinations should be considered. If IV contrast is deemed necessary, premedication should be ordered by the referring physician and the team should be present for the exam in anticipation of potential severe reactions.

b. Treatment of adverse contrast reaction:
   i. Immediately obtain the help of the radiologist or LIP. Radiologists should be prepared to manage contrast reactions until higher level providers arrive.
   ii. Mild or moderate reactions: Immediately assess the patient, obtain vitals and consider calling Code Rapid Response or alerting higher level providers for assistance. Staff should remain with the patient until Code Team arrives and patient care handoff is made.
   iii. Severe reactions: Immediately assess the patient, obtain vitals and call Code Blue. Staff should remain with the patient until Code Team arrives and patient care handoff is made.
   iv. Ensure allergy and severity is documented in Cerner (ORCHID)

c. Medication availability:
   i. Adult and pediatric crash carts are present in the following locations:
      1. Main CT suite
      2. Special procedures
      3. MRI suite
   ii. Contrast reaction kits with Benadryl and EpiPen® (epinephrine injection, USP) 0.3 mg are present in the following locations:
      1. Ultrasound/Breast Imaging
      2. Nuclear Medicine

d. Contrast extravasation
   i. In the event of an extravasation event during power injector use, the CT technologist is responsible for:
      1. Noting the estimated volume of contrast extravasation and documenting on a contrast extravasation form, which is scanned into the patient's PACS documents
      2. Notifying the covering LIP
      3. Submitting an event report in the PSN

IX. RADIOLOGICAL PROCEDURES IN PATIENTS WITH TUBE PLACEMENTS

a. Administration of radiographic contrast, radiopharmaceutical or other agents through tubes placed into luminal structures or cavities can have serious complications. Often, when there are multiple tube placements, all of the ports are taped to the skin in one part of the body even

though the tubes are directed to different regions or organs.

b. Radiologists, Radiology Nurse, Special Procedures/Radiologic Technologists are to identify the type and location of all tubes prior to administration of contrast. If tubes cannot be well identified, the referring physician will be contacted for clarification. If confirmation cannot be obtained, the nurse responsible for the patient will be requested to come to the Department of Radiology to identify the tubes or uncover dressing to help identify tube.
c. Prior to administration of radiographic contrast, radiopharmaceutical or other agents into tubes, of which the exact location cannot be determined, the radiologist, Radiology Nurse, or Special Procedures/Radiologic Technologist is to determine the destination of tubes based on the characteristics of the fluid aspirated from the tubing. If this is not conclusive, the study should be rescheduled until the appropriate referring physician can confirm placement of the tube.

References: Joint Commission Standards MM 5.10, MM 6.20	
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