



## Strategic Use Of Contrast Arteriography

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**No disclosures**




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**Contrast is bad...**

**EVIDENCE SUMMARY**

**Contrast induced nephropathy**

From: American Journal of Kidney Diseases. 2001;37(5):1048-1056.

OBJECTIVE: To determine the incidence of contrast-induced nephropathy (CIN) in patients undergoing percutaneous coronary intervention (PCI) and to identify risk factors for CIN.

DESIGN: Retrospective cohort study.

SETTING: A tertiary care hospital.

PARTICIPANTS: 100 patients undergoing PCI.



MEASUREMENTS AND MAIN RESULTS: The incidence of CIN was 10%. Risk factors for CIN included a baseline serum creatinine level > 1.5 mg/dL, a contrast dose > 100 mL, and a procedure duration > 30 minutes.

CONCLUSIONS: CIN is a common complication of PCI. Risk factors for CIN include a baseline serum creatinine level > 1.5 mg/dL, a contrast dose > 100 mL, and a procedure duration > 30 minutes.

The volume of contrast used during a procedure is a major risk factor for contrast-induced nephropathy (CIN).

Risk increases with large doses or multiple injections.

**The volume of contrast should be kept as low as possible!**

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Minimizing iodinated contrast volume is associated with:

- Reduction in contrast-induced acute kidney injury
- Length of stay
- Health care system costs<sup>1</sup>

**➔ You CAN use lower contrast volumes without sacrificing procedural success rates!**



Morabito S, Pistoletti V, Benedetti G, et al. Incidence of contrast-induced acute kidney injury associated with diagnostic or interventional coronary angiography. J Nephrol. 2012 Nov-Dec;25(6):1098-107.

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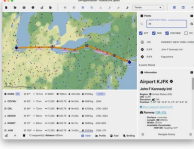
**First day on the job...**






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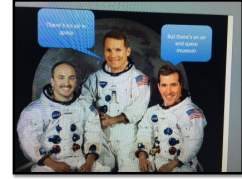
### Strategic Use of Contrast Arteriography



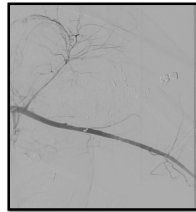
- Plan your route carefully
- Avoid flying through areas of high traffic, congestion, or turbulence → increase flight time and fuel burn
  - Optimal altitude, as it affects density, temperature and wind speed → fuel efficiency
  - Higher altitude reduces drag, increases fuel efficiency, however, consider the climb and descent

### Flight Planning

- Assessment of patient risk versus potential benefit of the contrast – assisted examination
- Imaging alternatives that would provide the same or better diagnostic information
- Assurance of a valid clinical indication for each contrast medium administration



### Need to plan the route...



Carefully review the patient's prior angiograms, especially for patients with complex anatomy

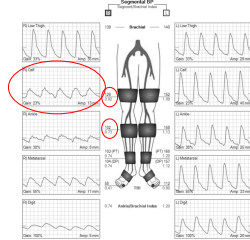
Use anatomic landmarks, bones and calcium

This helps to limit angiograms to the projections that best show significant lesions

24 ml Contrast

### Segmentals...

- Abnormal
- >20 mmHg difference side to side
  - >30 mmHg same side between levels suggestive of significant arterial obstruction between the segments measured



If an artery is completely occluded, a gradient of greater than 40 mmHg is observed.

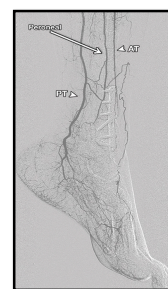
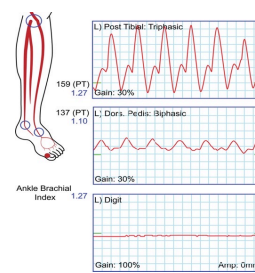
### Gather the data : Strategic use of the vascular lab...




Vessel Disease	ABI	TBI	Doppler	PVR
Calcified Vessel	> 1.4	unaffected		
Normal	0.9 - 1.4	> 0.6		
Mild PAD	0.7 - 0.89	0.34 - 0.59		
Moderate PAD	0.51 - 0.69	0.12 - 0.34		
Severe PAD	≤ 0.5	≤ 0.11		




- Non-invasive vascular lab imaging should guide access, contrast dosing and intervention.
- Diagnostic arteriograms should always be limited.
- Don't need all the imaging



### Dialysis Access



Clinical history + duplex / b-mode




### CT

- Aortic Arch
- Mesenteric

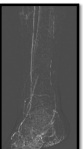





### CO2 Imaging






- Carbon dioxide (CO2) angiography is an alternative to conventional iodinated contrast angiography
- The main benefits of using CO2 for angiography are that CO2 has no adverse effects on the kidneys or the immune system and that it is the least expensive contrast medium.
- CO2 can be used for a variety of procedures:
  - Arteriography
    - Renal arteries
    - Mesenteric arteries
    - Uterine arteries
    - Peripheral arteries

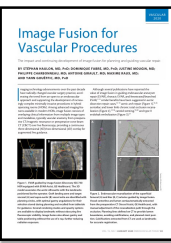
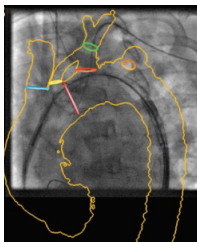


### CO2 Arteriography

- CO2 should not be combined with nitrous oxide sedation because N2 mixes with CO2 and reduces the solubility of CO2 in blood preventing its excretion.
- CO2 arteriography should not be used above the diaphragm to avoid the possibility of causing a cerebral air embolism with associated stroke or death. There are two mechanisms by which cerebral air embolism occur:
  - Through a known or unknown right to left cardiopulmonary shunt (cardiac septal defect, pulmonary arteriovenous malformation)
  - From reflux within a carotid or vertebral artery to the brain
- It is therefore prudent to have the patient in slight Trendelenburg position when possible.

### CT fusion

#### Image Fusion for Vascular Procedures

### Key Points

- Review prior imaging including CT / Previous angiograms
- Use of the vascular lab is underutilized for planning of angiography and interventions
  - Proper use will lead to a decrease in radiation exposure and a decrease in contrast volume
- Check off prior to injection
- No use for full strength
- Use of smaller catheters
- Avoid unnecessary puffs or hand injections
- Conder use of other helpful modalities such as CO2 angiography and CT fusion technology
- ALARA: As Low Little as Reasonably Achievable

Thank you!

