CONTRAST MEDIA OPTIMIZATION IN PATIENTS WITH CHRONIC KIDNEY DISEASE DURING THE TREATMENT OF CRITICAL LIMB ISCHEMIA

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CONTRAST AGENTS FOR ENDOVASCULAR USE

- ***Iodine.***

- C02
- Gadolinium (NSF)

NEPHROGENIC SYSTEMIC FIBROSIS

- Rare syndrome that involves fibrosis of skin, joints, eyes, and internal organs
- In 2006, the link between NSF and gadolinium-containing contrast agents was made.
- FDA and european agencies considered gadolinium agent contraindicated in patients with an estimated glomerular filtration rate under 30 ml/mn.

NSF (NEPHROGENIC SYSTEMIC FIBROSIS)

- ✓ As a result:

- We cannot use gadolinium in IR as a radio opaque agent in patients with impaired kidney function

- We cannot use MRA with gadolinium as a non invasive test for screening / work up patient with CLI

- Iodine
- CO_2

CO_2 AS CONTRAST AGENT

- Classic approach for CO_2 use is a closed-system with a 50 cc syringe.
- Angiogdroid. Power injector can deliver a steady amount of CO_2 that provide better image quality.
- Angio suite capabilities: software sum up images

- Main concern: quality of the exam unpredictable

- Patient habitus dependent.

Mem Acad Chir (Paris). 1969;95(26):746-51.

[Carboxyangiography in subhepatic venous exploration].

[Article in French]

Seror J, Bendib M, Toumi M, Piva G, Boudjellab A, Mentouri B, Guedj P.

Ann Radiol (Paris). 1973;16(5):305-30.

[A new method of phlebography: carboxyangiography extended to exploration of the venous system and more precisely, to study of the supra-hepatic veins].

[Article in French]

Bendib M, Toumi M, Boudjellab A.


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IODINE

- Allergy to contrast media.
- Chronic Kidney Disease.

IODINE

- CLI patients:

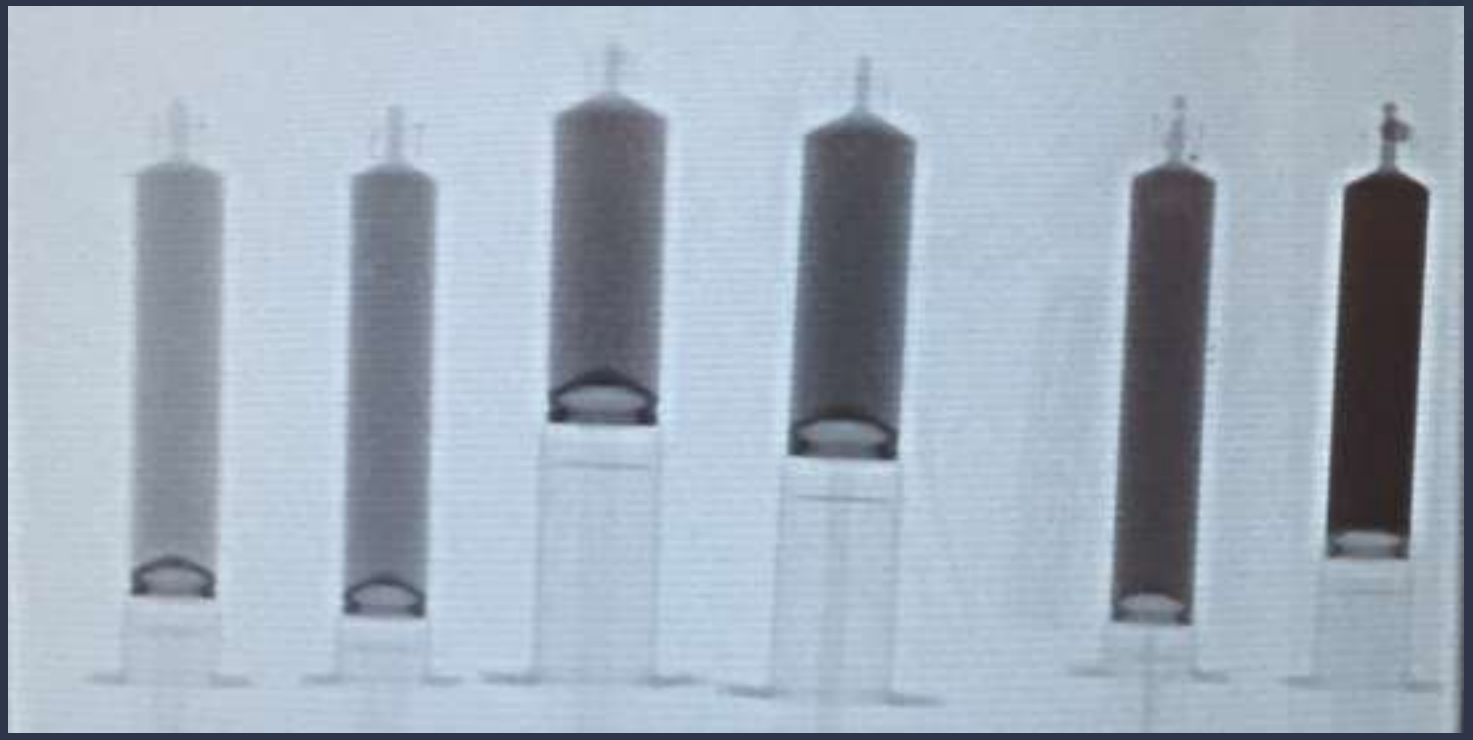
  - ✓Comorbidities:
    - Diabetes mellitus
    - Renal failure

- CIN is one of the major causes of hospital-acquired acute kidney injury and represents about 12% of the cases.

- A meta-analysis that included 40 studies, found a
  - 6% incidence of CIN after CT
  - 9% incidence of CIN after peripheral angiography

- Iodine: (How can we optimize?)
  - Volume
  - Concentration

HIGH DILUTION APPROACH



10% 20% 30% 40% 50% 100%

STRATEGIES FOR CONTRAST MEDIA SAVINGS

- First step: look for available studies

- Recent CTA (from the institution of from OSH)
- CT of the pelvis. (inflow)

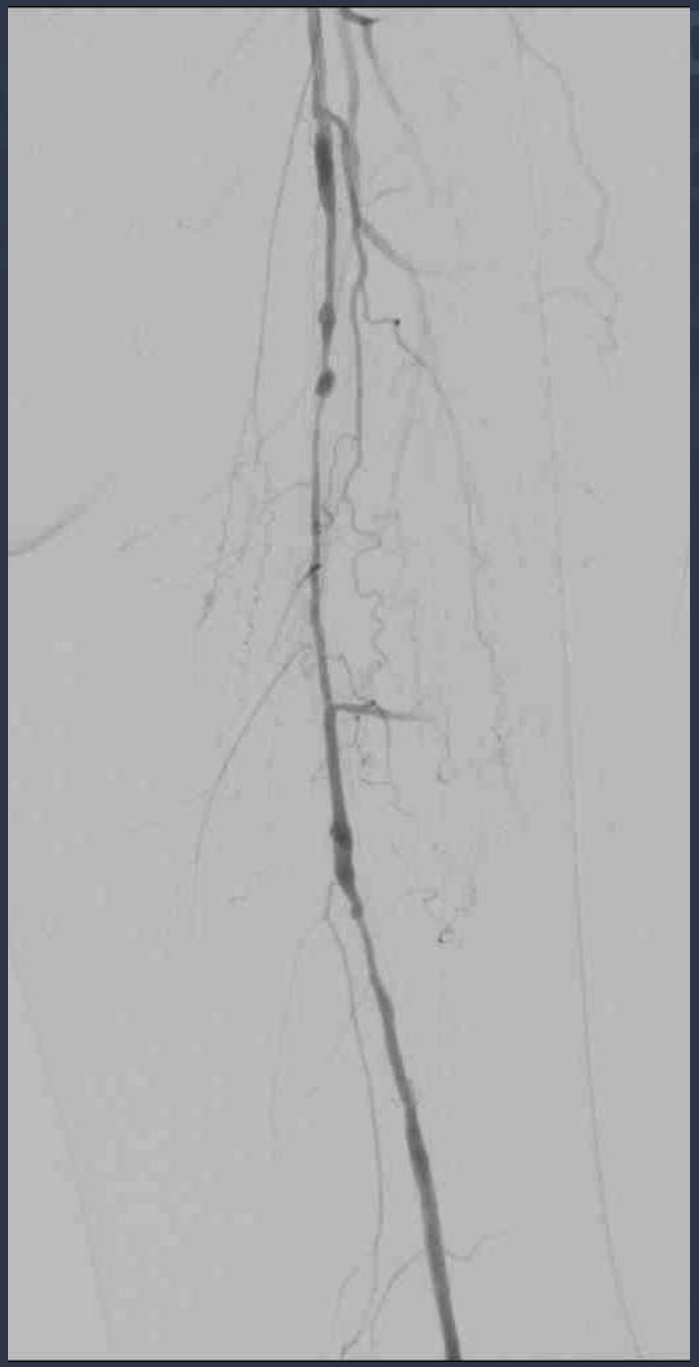
- MRA is prohibited in this group of patients.
  - TOF MRA (non contrast MRA sequences)

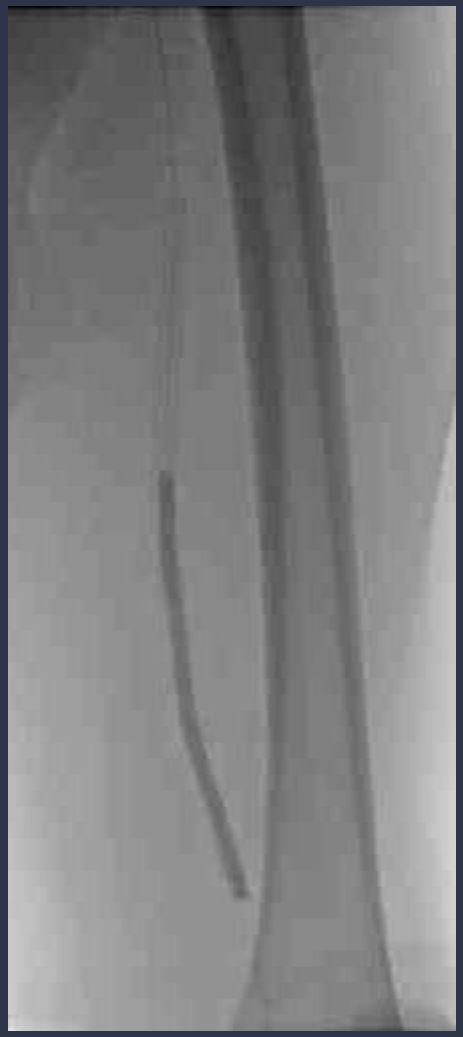
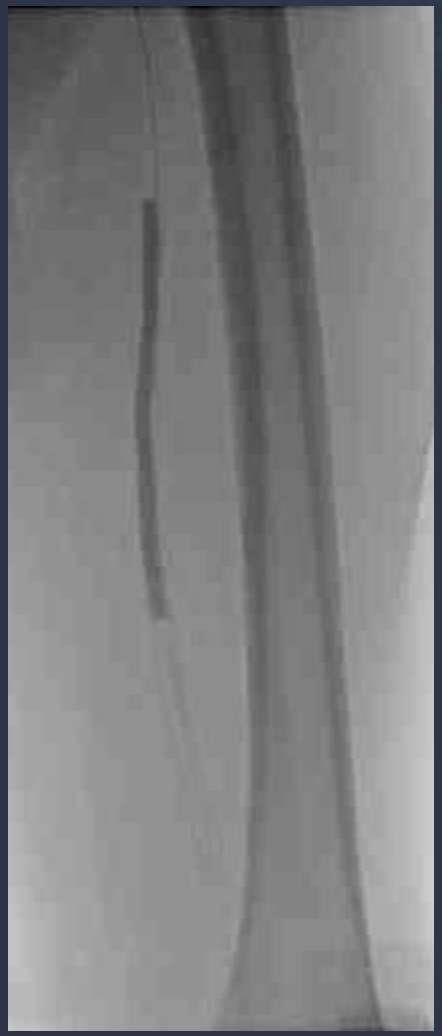
STRATEGIES FOR CONTRAST MEDIA SAVINGS

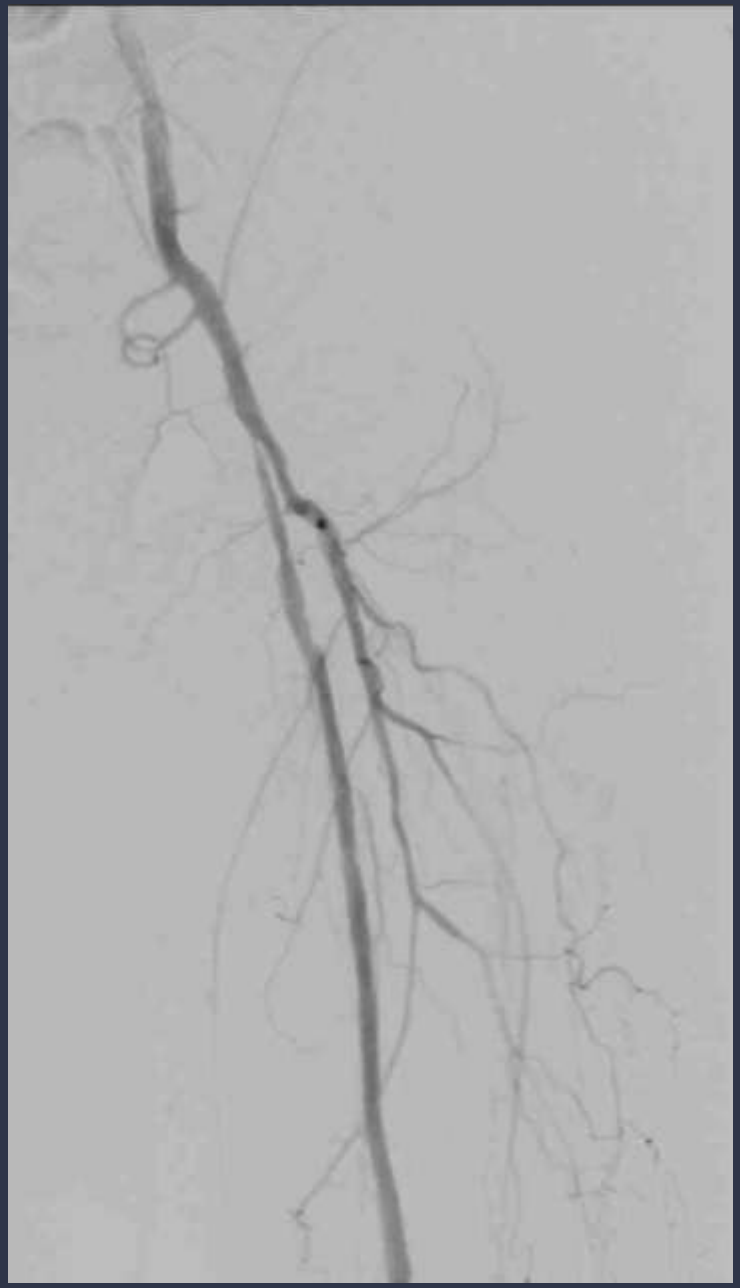
- Information about the inflow (CTA, CT pelvis, Non contrast MRA…)
- Access (retrograde or anterograde access), ipsilateral or contralateral.
- Angiograms (selective) at the time of the interventional procedure
  - Require less volume of contrast.
  - ✓ High dilution approach

- CLI

- Diabetes
- Hypertension
- eGFR <30



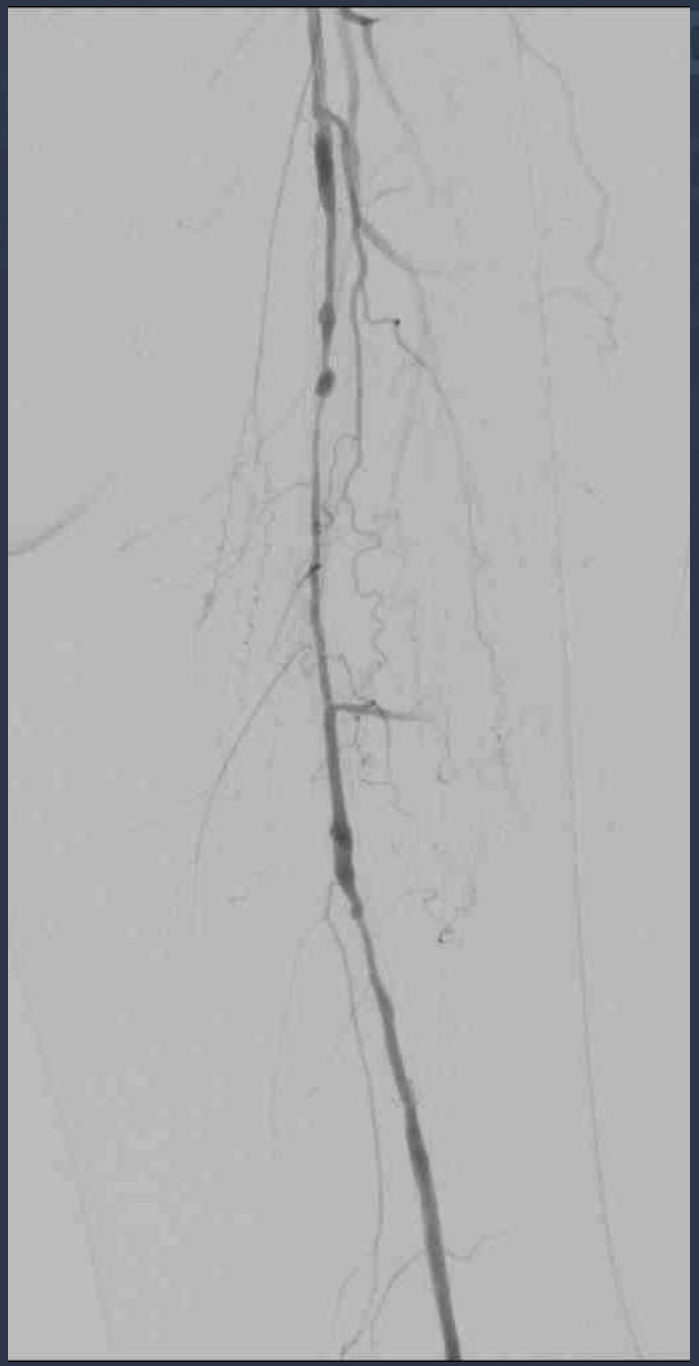



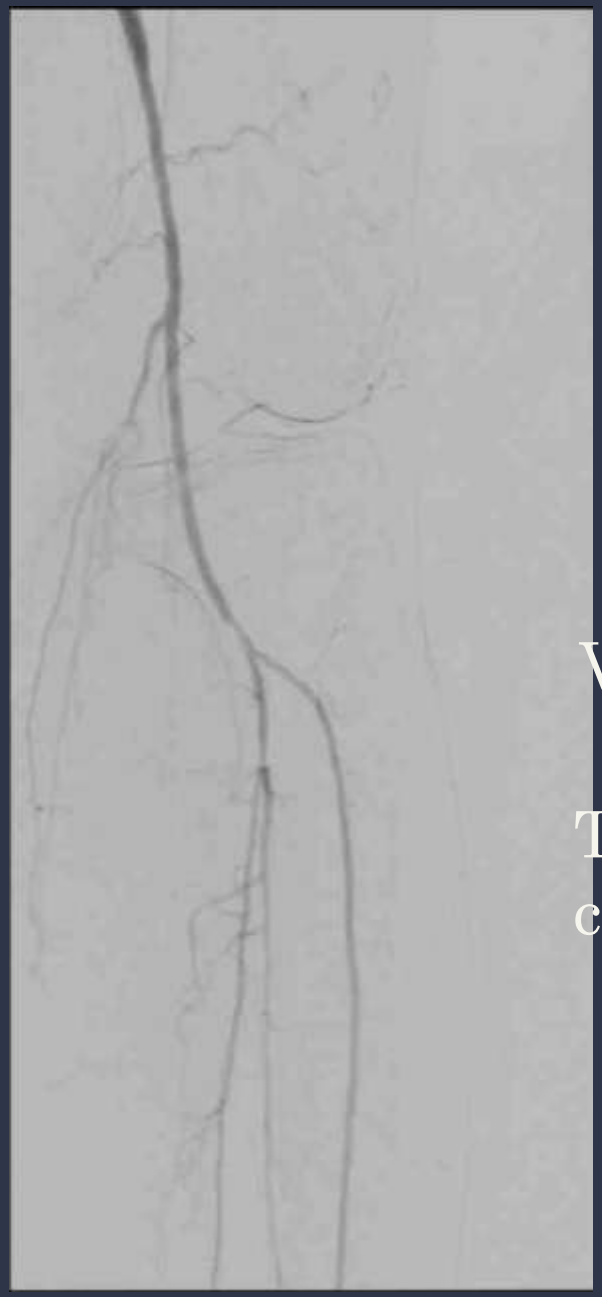
- Long procedure.
- Mutiple angioplasties
  - Atherectomy
  - Balloon angioplasty
  - Drug eluting balloons
  - Control angiograms

  - Total dose of contrast media:
  ✓ 16 cc

- 2cc contrast/6cc saline
- Injected volume 4cc
- Total amount of contrast media:

  2/8 x4 =1cc





Ratio:

3cc contrast /

6cc saline

Volume injected: 7cc

Total volume of contrast: 2.3 cc

HIGH DILUTION APPROACH

- Close monitoring of the contrast injected.
- Use high dilution (selective angiograms).
  - Each injection :
    - We write down the concentration of the contrast and volume injected on the table
    - Based on the image quality obtained we can adjust both ratio and volume
    - Learning curve
    - Volume beween15 cc and 25 cc when treating CLI patients at Cleveland Clinic Abu Dhabi

COMBINED APPROACH

- Combined CO_2 and High dilution contrast media technique
- CO_2 : Overview, localization of the lesion
- Plan for the angioplasty/stenting.
- Switch to contrast media for accurate sizing, lesion assessment and control angiogram post angioplasty/stenting.

CONCLUSION

- Interventionists:

  ✓ We are responsible:

  – Contrast media administration.
  – Optimization is a requirement.
  – Simple measures have great impact on patient outcomes.