Contrast Induced Nephropathy (v2.0)

Clinical Director

Signed: [Signature]

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### Meta Data

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### Revision History

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1. Flow Chart

**Does the patient have a normal renal function?**

(eGFR >60mls/min/1.73m² can be regarded as normal)

*In emergencies where eGFR is unknown proceed but follow ESUR guidelines*

- **Yes**
  - <100mls IV contrast
    - no specific requirements

- **No**
  - >100mls IV or IA contrast –
    - omit metformin for 48 hours post procedure

**60>eGFR>30**
- Omit metformin for 48 hours BEFORE and AFTER procedure
- Hydrate for 4 hours pre and 24 hours post procedure. This can be done orally at home with similar volumes as would be administered as inpatients. Thus 1 litre pre and 2 litres post procedure

**eGFR<30**
- Patient should not be taking Metformin, diabetic management should be reviewed
- If contrast angiography essential, image as inpatients and hydrate with IV normal saline pre and post procedure
- Monitor clinically for 24 hours and re check eGFR before discharge

**On dialysis**
- Avoid highly osmotic fluids
- No need to time contrast with planned dialysis
- Gadolinium not necessarily safe
2. Overview/Introduction

Contrast induced nephropathy is a potentially serious untoward reaction to radiologic contrast media and can be defined as acute renal failure following administration of intravascular contrast diagnosed by ‘an acute rise in serum creatinine by >24% or by >44 micromoles within 3 days of receiving intravascular contrast’.

This guideline has been developed to minimise the risk of occurrence of a) Contrast Induced Nephropathy and b) to manage more effectively diabetic patients taking Metformin who may be at risk of developing Type B lactic acidosis.

This guideline will also highlight the risk factors to be taken into consideration prior to the administration of intravascular contrast media and the protective steps to be taken prior to, during and after the procedure.

Contrast Induced Nephropathy can arise secondarily to the following three renal insults, with the aetiology of these insults identified below:

- **Impaired Renal Perfusion:**
  - Cardiotoxicity
  - Peripheral vasodilation
  - Reduced renal blood flow
  - Increased RBC rigidity
  - Osmotic diuresis

- **Glomerular/Tubular Injury:**
  - Decreased perfusion
  - Hyperosmolar effects
  - Cytotoxicity

- **Obstructive Nephropathy:**
  - Cytoplasmic vacuolation
  - Tamm-Horsfall protein deposition
  - BJ protein precipitation (MM only)

2.1 Predisposing Risk Factors

The following predisposing risk factors have been identified:

- Increased (creatinine);
- Diabetes;
- Dehydration;
- CCF;
- Age > 69 years;
- Concomitant nephrotoxins (ACEI, NSAIDs, Furosemide);
- Contrast load (>100mls).
2.2 Incidence rate

The following incidence rate has been highlighted:

14.5% in patients undergoing coronary angiography (+/- intervention). There is a 36% mortality rate and a 0.8% chronic haemodialysis rate associated with contrast induced nephropathy in this group of patients.

8% of patients undergoing peripheral angiography/plasty. There is a 20% mortality rate in this group if they develop contrast nephropathy.

2.3 Reason for Development of the Guideline

The guideline has been formulated because current guidance relating to the prevention of Contrast Induced Nephropathy within the Trust is variable and unclear.

2.4 Methodology

The current guidelines from The European Society of Urogenital Radiology and The Royal College of Radiologists were examined along with unpublished guidance from the Radiology and Nephrology Directorates within the Trust. All parties with an interest were asked to comment on the written guidelines and these observations were incorporated into the final draft. Individuals providing advice included Mr. J.M. Scriven, Mr. M.X. Gannon, Mr. T. Wilmink, Dr. P. Crowe, Dr. J. Henderson, Dr S. Smith and Dr. H. Rayner.

2.5 Implementation

These guidelines will be disseminated to all junior medical staff attached to the Vascular Surgery Directorate as part of their local induction, and will appear in written form in the Vascular Surgery Junior Doctors Handbook.

2.6 Monitoring

This guideline will be formally reviewed every three years. The impact of the guideline will be audited 12 months after implementation.

3. Application of the Guideline

This guideline will apply to all patients undergoing contrast enhanced radiological vascular imaging at the request of the Vascular Surgical Directorate.
4. Objectives of the Guideline

To reduce the risk of Contrast Induced Nephropathy by informing medical staff about the potential risks of contrast induced nephropathy and by provided guidance on minimising these risks.

5. Guideline Steps

Check the renal function of all patients undergoing contrast enhanced vascular imaging
Check the patients prescribed medication for Metformin
Follow the Flow chart included with this guideline

6. References

1. European Society for Urogenital Radiology
2. Royal College of Radiologist Recommendations