Prevention guidelines for contrast-induced nephropathy in contrast-enhanced CT: Appropriate and cost-effective? The Amsterdam, Maastricht, Alkmaar, Contrast Induced Nephropathy-Guideline study (the AMACING study)

Published: 19-07-2013
Last updated: 24-04-2024

The objective of our study is to investigate the relative (cost-)effectiveness of the two Dutch guidelines in patients receiving intravenous iodinated contrast medium during computed tomography. A cohort study will compare both screening methods to...

Ethical review	Approved WMO
Status	Will not start
Health condition type	Nephropathies
Study type	Interventional

Summary

ID

NL-OMON38644

Source
ToetsingOnline

Brief title
The AMACING study

Condition

- Nephropathies

Synonym
acute kidney injury, acute renal failure

Research involving

Human

Sponsors and support

Primary sponsor: Academisch Medisch Centrum
Source(s) of monetary or material Support: ZonMw

Intervention

Keyword: Acute kidney injury, Computed Tomography, Contrast Medium, Nephropathy

Outcome measures

Primary outcome

The primary endpoint of the cohort study and randomized trial is the net number

of CIN cases prevented.

Secondary outcome

The secondary endpoints are: cost effectiveness of screening and prevention.

Health-related quality of life, complications of intravenous hydration and

morbidity and mortality up to 30 days after iodinated contrast material

administration.

Study description

Background summary

Contrast-induced nephropathy (CIN) is a side-effect of intravascular administration of iodinated contrast media. It is defined as an increase in serum creatinine within 48-72 hours of iodinated contrast medium administration and is usually reversible, resolving within two weeks.

CIN prevention guidelines aim to identify patients at risk of CIN, and to subsequently prevent CIN in those at risk patients through prophylactic intravenous hydration before and after exposure to iodinated contrast medium. The CIN incidence in patients receiving intra arterial iodinated contrast medium is higher compared to patients receiving intravenous iodinated contrast medium during computed tomography.The greater part of CIN prevention guidelines

is based on data acquired from patients undergoing cardio angiographic procedures in which intra-arterial high bolus contrast media are administered in hemodynamic unstable patients.

In addition, different studies including both patients receiving intravenous iodinated contrast medium and patients not receiving iodinated contrast medium show that there is no association between increase in serum creatinine (CIN) and the administration of intravenous iodinated contrast medium in patients with a decreased renal function. Another large cohort study where propensity matching was performed in patients receiving intravenous iodinated contrast medium versus patients not receiving intravenous iodinated contrast medium the CIN incidence was not significantly different.
This indicates that the risk for CIN in patients receiving intravenous iodinated contrast medium is low.

These new insights led the European Society of Urogenital Radiology (ESUR) to review their prevention guideline on CIN. The updated ESUR guideline indicates not to use intravenous prophylactic hydration in patients with an eGFR * 45 ml/min/1.73m2. This means that prophylactic intravenous hydration for intravenous contrast administration is superfluous in the largest part of patients identified as being at risk of CIN by Dutch prevention guidelines (eGFR 45-60 ml/min/1.73 m2). This is the larger proportion of the patients that will be included in our randomized controlled trial (RCT).

We will also include patients with eGFR between 30-44 ml/min/1.73 m2. For this group the risk for CIN after intravenous administration contrast medium appears also to be minimal. In studies with patients receiving intravenous contrast medium without prophylactic intravenous hydration or having severely diminished kidney function, low CIN incidences were seen (range: 1.3% - 5.2%; pooled incidence 3.6%). In studies on intravenous iodinated contrast medium administration without prophylactic intravenous hydration, a pooled CIN incidence of 3.9% (30/760) was described. Of these 30 patients, 25 did not have an eGFR 30-44 ml/min/1.73 m2, and eGFR range of the other five cannot be determined from the given data; thus potential CIN incidence in patients with an eGFR between 30-44 ml/min/1.73 m2 is either zero or at maximum 0.7% (5/760).

The abovementioned data lead to the question, whether hydration can be omitted, as there is no evidence that prophylactic intravenous hydration has a protective effect .
Importantly, the association between the increase in serum creatinine (CIN) and any adverse event has not been demonstrated.

Another issue is that prophylactic intravenous hydration is not without risk as patients may develop pulmonary oedema and/or cardiac failure which could lead to respiratory insufficiency. This risk has not been properly evaluated in the context of CIN since only few articles mention these risks, and it is unknown

how this risk relates to the risk for developing CIN.

In summary, firstly the risk for CIN is low in patients receiving intravenous iodinated contrast medium. There is no evidence showing the protective effect of prophylactic intravenous hydration in patients receiving intravenous iodinated contrast medium. Thirdly, the association between the increase in serum creatinine (CIN) and any adverse event has not been demonstrated. Fourthly, prophylactic intravenous hydration is not without risk.
We therefore hypothesize that intravenous prophylactic hydration can be omitted in most patients receiving intravenous prophylactic hydration without increase of CIN incidence and adverse events in these patients.

Study objective

The objective of our study is to investigate the relative (cost-)effectiveness of the two Dutch guidelines in patients receiving intravenous iodinated contrast medium during computed tomography. A cohort study will compare both screening methods to see which method is most (cost) effective. We will also analyse which risk factors are best associated with contrast induced nephropathy in this population.
A randomised controlled trial will determine the efficiency of prophylactic intravenous hydration with normal saline in the prevention of contrast induced nephropathy, persistent decreased renal function, morbidity and mortality up to 30 days after iodinated contrast material administration.

Study design

Our study consists of two components and will take place in three medical centres. One academic hospital: the Academic Medical Centre (AMC); one peripheral hospital: the Medical Centre Alkmaar (MCA); and one combination academic-peripheral hospital: the Maastricht University Medical Centre (MUMC+) . At the AMC and MCA patients are screened and treated according to the VMS guideline. At the MUMC+ patients are screened and treated according to the CBO guideline.
The first part of our study is a cohort study comparing the VMS and CBO screening methods used at the different centres. In order to achieve this, all information required for the implementation of both guidelines will be collected at all sites. All patients identified as being at risk of developing CIN according to the guidelines and being given the indication for intravenous prophylactic hydration will be included in the randomized controlled trial. Patients will be randomized to either receive intravenous prophylactic hydration (standard care) or no intravenous hydration (control group). Patients included in the randomized controlled trial will receive a 30 day follow-up. Patients identifed as being at risk by VMS but not by CBO will receive a similar follow up but will not be included in the randomised controlled trial as they have no indication for hydration according to standard CBO care.

The primary outcome is net CIN cases prevented. In addition, cost-effectiveness of VMS & CBO CIN prevention guidelines at the level of screening and CIN prevention will be assessed.

Intervention

In the randomized controlled trial patients will be randomized to receive standard care, i.e. prophylactic intravenous hydration before and after intravenous iodinated contrast medium administration. The intervention group will receive no prophylactic intravenous hydration before and after intravenous administration of iodinated contrast medium.

Study burden and risks

Patients included in the cohort study will receive standard care, for these patients there is no increased risk or burden. Patients included in the intervention group of the randomized controlled trial (i.e. no intravenous prophylactic hydration) are expected to have no or a minimally increased risk for developing contrast induced nephropathy. Research carried out in patient populations receiving intravenous contrast media administration showed minimal risk of CIN even in patients not receiving prophylactic intravenous hydration. This has led the European Society of Urogenital Radiology (ESUR) updating their guidelines for the prevention of contrast induced nephropathy in order to make a distinction between intra-arterial and intravenous contrast medium administration, in the assumption that patients receiving intravenous contrast medium have a smaller risk of developing contrast induced nephropathy and do not in part require prophylactic hydration. This, in combination with recent findings showing an absence of clinically relevant effects (i.e. increased morbidity and mortality risk) after intravenous contrast administration, leads us to consider the risk incurred by participation in this study to be acceptable.
Patients will be asked to fill in a questionnaire five times during the course of the study (before & after the CT scan and/or intravenous hydration, and 2-5, 10-14 & 30 days after the CT scan) , which will take a maximum of 15 minutes each time. Patients will be asked to give a blood sample in order for us to determine renal function 10-14 days after the CT scan. This means that patients will visit the hospital one extra time. If at that time renal function has not returned to a value similar to baseline, the referring physician will be informed and the patient will be referred to them for further treatment. We will ask these patients to return at 30 days after the CT scan to give another blood sample for renal function determination.

Contacts

Public
Academisch Medisch Centrum

Meibergdreef 9
Amsterdam 1105 AZ
NL
Scientific
Academisch Medisch Centrum

Meibergdreef 9
Amsterdam 1105 AZ
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

All patients aged 18 years and above, scheduled to undergo elective contrast enhanced computed tomography (no emergency department or intensive care unit) with intravenous iodinated contrast material administration.
Patients with an indication for prophylactic intravenous hydration according to one of the Dutch CIN prevention guidelines will be eligible for randomization.
Indication is defined as: eGFR 30-44 ml/min/1.73m2; eGFR 45-59 ml/min/1.73m2 & diabetes mellitus or * 2 risk factors; Kahler*s disease (multiple myeloma) / Waldenström*s macroglobulinemia with small chain proteinuria. Risk factors include: age >75, anaemia, use of nephrotoxic medication, cardiac or peripheral vascular disease.

Exclusion criteria

Patients will only be included once in the RCT; no repeat inclusion for additional contrast enhanced CT examinations will occur.

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Open (masking not used)

Primary purpose: Prevention

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	2000
Type:	Anticipated

Ethics review

Approved WMO

Date:	19-07-2013
Application type:	First submission
Review commission:	METC Amsterdam UMC

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL43664.018.13