N-Acetyl cysteine for prevention of contrast induced nephropathy

Anisul Awal1, Syed Ali Hasan1, Md. Abu Siddique1, Bikash Subedi1, Jahanara Arzu1 Quazi Arif Ahmed1,
KMHS Sirajul Haque1, Md. Ashraf Uddin Sultan1, Neena Islam1
1Department of Cardiology Bangabandhu Sheikh mujib Medical University (BSMMU), Shahbag, Dhaka

Address for Correspondence
Dr. Anisul Awal, Department of Cardiology, Bangabandhu Sheikh Mujib Medical University
Shahbag, Dhaka
E-mail : anisulawal@yahoo.com

Abstract

The antioxidant N-acetyl Cysteine prevents contrast induced nephropathy in patients with impaired renal function who undergo coronary angiography. However its role in Bangladeshi population is not clear. This study was done determine whether oral acetylcysteine prevents contrast induced nephropathy in high risk patients. 100 patients with mild to moderate renal insufficiency who are undergoing elective coronary angiography with or without intervention. 50 patients were randomly assigned to receive oral N acetyl cysteine (600mg) twice daily on the day before and on the day of procedure. All patients received low osmolar contrast agent. 10 (20%) control patients (no premedication group) and none of acetyl cysteine (0%) group developed a more than 25% increase in serum creatinine level within 48 hours after contrast exposure. Acetyl cysteine prevents contrast induced nephropathy.

Keywords : Anti Oxident, contrast induced nephropathy.

Introduction

Contrast induced nephropathy is a recognized complication after coronary angiography and intervention that has been associated with prolonged hospitalization and adverse clinical outcomes1-3. It is reported that 14.5% of patients develop contrast induced nephropathy (CIN)2. This problem assumes greater and greater importance with increased use of invasive radiological procedures to diagnose and treat coronary artery disease.

CIN is potentially preventable because the administration of radio contrast agent is predictable and high risk population has also been identified4. Patients at greater risk are those with impaired renal function5, particularly that caused by diabetic nephropathy6. However other than the use of intravenous hydration and lower osmolarity contrast media, no previous strategies has been shown to prevent CIN.

N acetyl cysteine ia an anti oxidant that has been shown to attenuate ischemic renal failure in animal studies7. The low cost of acetyl cysteine, its ease of administration and its limited adverse effects are all compelling reasons to further investigate its role in patients undergoing coronary angiography.

Methods

This study was carried out in the department of Cardiology of Bangabandhu Sheikh Mujib Medical University from January 2007 to December 2008. This study protocol was approved by ethical committee of the department of cardiology. Patients undergoing coronary angiography with or without intervention with mild to moderate renal impairment were randomly selected for the study and those having history of contrast allergy, patients on  renal dialysis, advanced congestive cardiac failure, patients unwilling to undergo the procedures were excluded from the study.

Total of 100 patients were selected and divided into two groups - Group A as control group and group B with patients receiving N-acetylcysteine and hydration as premedication.

Preprocedural serum creatinine was considered as basal serum creatinine. Basal serum creatinine3 1.2mg/dl was considered as mild renal impairment as different study show S creatinine3 1.2mg/dl is equivalent to creatinine clearance rate of £60 ml/min which indicate mild renal impairment, main risk factor for CIN. After taking brief history, preliminary selection was done and the purpose of the study was explained in details to each subject. Informed consent obtained from the subject. They were advised to take usual daily diet, to do normal physical activities and to avoid drugs that significantly interfere with serum creatinine level (NSAID, Metformin). Patients were assigned as

a) Group A patients who admitted in the morning of the undergoing procedure who could not get premedication.

b) Group B patients who were given N-acetylcysteine...
600 mg orally in bid dose for two days, starting a
day before the procedure in high risk group patient
before CAG / PCI along with prehydration with
1ml/kg/hour normal saline intravenously 12 hours
before and 12 hours after the CAG and PCI in high
risk patients.

Serum creatinine was estimated 24 hours after the contrast
exposure in the same laboratory from where basal serum
creatinine estimated.

Creatinine clearance (CrCl) rate was calculated from
Cockcroft-Gault formula.

Statistical analysis

Statistical analysis was conducted on SPSS (Statistical Package for Social Science) software for windows version 12.0. Categorical data were expressed in percentage or number.Parametric data were expressed in mean±SD. Parametric data were evaluated by Student's “t” test and categorical data were evaluated by chi-square test as needed. Significance was defined as p value <0.05.

Results

A total of 100 admitted coronary heart disease patients
under went coronary angiography (CAG) and percutaneous
coronary intervention selected for this study. The age group
ranges from 32-76 years. The baseline variables including
diabetes, hypertension, dyslipidemia, BMI, ejection frac-
tion, angiographic diagnosis and amount of dye used were
similar in both group.

Baseline characteristics

Table II: Development of contrast induced nephropathy (ICIN)

<table>
<thead>
<tr>
<th>Group A (n=50)</th>
<th>Group B (n=50)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>40(80%)</td>
<td>49(98%)</td>
</tr>
<tr>
<td>CIN developed</td>
<td>10(20%)</td>
<td>0(0%)</td>
</tr>
</tbody>
</table>

Discussion

The antioxidant N acetyl cysteine was found to prevent
CIN in patients undergoing coronary angiography with or
without intervention in our study. CIN results from both
renal tubular toxicity and renal medullary ischemia. Exposure to contrast produces nephrotoxic oxygen free
radicles. In addition to scavenging oxygen free radicals that
mediate cell necrosis, N acetyl cysteine may act as anti oxi-
dant to inhibit ischemic cell death in the kidney. Previous
studies also suggest that N acetyl cysteine has vasodilator
properties. So N acetyl cysteine prevents CIN by
inhibiting direct oxidative damage and by improving renal
hemodynamics the incidence of CIN in our study is 20% in
no premedication group and none of the patients of premed-
ciation group develop CIN group which is statistically sig-
nificant. Although some of the patients serum creatinine of
premedication group increased followinf contrast exposure,
that was not sufficient to label them as CIN. Our findings of
incidence of CIN is consistent with previous investigators
findings.

Study Limitations

Our limitation was -number of the study population was
smaller, single center study and other causes of alternative
etiology of nephropathy could not be excluded.

Conclusion

N Acetylcysteine along with hydration prevents contrast
induced nephropathy in high risk patients.

References

1. Werner C,Mann D, D’Elia J, Silva P. Effect of Saline,
Mannitol and furosemide to prevent acute decrease in renal
function induced by radiocontrast agents. NEJM. 1994;
331:1416-20.

2. MCCollough P, Wolyn R, Roher LL, Levin RN. Acute renal
failure after coronary intervention. Am J Med. 1997;103:
368-75.


