Incidence of contrast-induced nephropathy in diabetic patients undergoing percutaneous coronary intervention, Evaluation of the use of N-acetylcysteine to prevent such complication

Thesis

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Dedication

This work is dedicated to my brother: George Magdy.

Abstract

In This Thesis , the Incidenc Of contrast- induced Nephropathy (CIN) In Diabetic Patients Undergoing Percutaneous Coronary Intervention Has Been Studied. Two Types Of Dyes Were Used , The1st Is Ionic-high Osmolar Dye ,and The 2nd Is Nonionic –Low Osmolar Dye .Risk Factors For CIN Have Been Evaluated Such as , D.M., Hypertension, Preexisting Renal Disease , anemia , and gender . Evaluation Of the Use Of N-Acetylcysteine as a measure to decrease the incidence of CIN has also been done. The Most important risk Factors Were: Preexisting renal disease, D.M., and anemia . Neither nonionic – Iow Osmolar Contrast media nor N-acetylcysteine was a satisfactory Protective measure against CIN .

Key Words:

Contrast –induced nephropathy

Diabetes Mellitus

Percutaneous Coronary intervention

N-acetylcysteine

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Fady Magdy.

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List of abbreviations

ACE: Angiotensin converting enzyme.

ADH: Anti diuretic hormone.

ANP: Atrial natruretic peptide.

ARF: Acute renal failure.

CABG: Coronary artery bypass grafting.

CAD: Coronary artery disease.

cGMP: cyclic Guanosine mono-phosphate.

CIN: Contrast induced nephropathy.

D.M.: Diabetes Mellitus.

d: day.

ET: Endothelin.

Fig.: Figure.

GFR: Glomerular filtration rate.

GSH: Glutathione.

h: hour.

ICU: Intensive care unit.

MACE: Major adverse cardiac events.

MI: Myocardial infarction.

min: minute.

N-AC: N-acetylcysteine.

NO: Nitic oxide.

NOS: Nitric oxide synthases.

PCI: Percutaneous coronary intervention.

PG: Prostaglandin.

RBF: Renal blood flow.

TGF: Tubulo-glomerular feedback.

VCAM-1: Vascular cell adhesion molecule 1.

Introduction and aim of the work

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With the increasing use of radiographic contrast media in diagnostic and interventional procedures, contrast-induced nephropathy (CIN) has become an important cause of iatrogenic acute renal impairment. CIN is the acute deterioration of renal function after parenteral administration of radio contrast media in the absence of other causes. CIN is generally defined as an increase in serum creatinine concentration of > 0.5 mg/dL (>44 μmol/L) or 25% above baseline within 48 hours after contrast administration.

CIN has gained increased attention in the clinical setting, particularly during cardiac catheterization and also in many other radiological procedures in which iodinated contrast media are used. However, the reported incidence of CIN varies among studies.

The aim of this study is to estimate the incidence of CIN in diabetic patients undergoing percutaneous coronary intervention (PCI). Ninety patients, including 40 diabetic patients, were enrolled in this study. The patients aged 50-70 years old. All of them were adequately hydrated.

The use of N-acetylcysteine as a protective measure to decrease the incidence of CIN has been evaluated. Two types of radio-contrast dyes have been used: Ionic, high-osmolar dye: (Ioxithalamate) and Non ionic, low-osmolar dye: (Iopromide).

Important risk factors for the development of CIN have also been evaluated such as Diabetes Mellitus, preexisting renal disease, hypertension, anemia, and sex differences.

Serum ceratinine was measured 24 hours before and after the procedure. Fasting blood sugar level and hematocrit percentage were measured before the procedure.

Review of literature

Chapter 1: Anatomical and Physiological background

Gross anatomy of the kidney:

Kidneys are paired retroperitoneal organs that are situated in the posterior part of the abdomen on each side of the vertebral column. The upper pole of each kidney lies opposite the 12^{th} thoracic vertebra, and the lower pole lies opposite the 3rd lumbar vertebra. The right kidney is usually slightly more caudal in position. The weight of each kidney ranges from 125 to 170 g in the adult man and from 115 to 155 g in the adult woman. In humans, the kidney is approximately 11 to 12 cm in length, 5.0 to 7.5 cm in width, and 2.5 to 3.0 cm in thickness. Located on the medial or concave surface of each kidney is a slit, called the hilum, through which the renal pelvis, the renal artery and vein, the lymphatics, and a nerve plexus pass into the sinus of the kidney (Fig. 1-1). The organ is surrounded by a tough fibrous capsule, which is smooth and easily removable under normal conditions **(Clapp WL et al., 1994).**

In the human, as in most mammals, each kidney is supplied normally by a single renal artery, although one or more accessory renal arteries are not uncommon. The renal artery enters the hilar region and usually divides to form an anterior and a posterior branch. Three segmental or lobar arteries arise from the anterior branch and supply the upper, middle, and lower thirds of the anterior surface of the kidney (Fig. 1-2).

The posterior branch supplies more than half of the posterior surface and occasionally gives rise to a small apical segmental branch. However, the apical segmental or lobar branch takes origin most commonly from the anterior division. No collateral circulation has been demonstrated between individual segmental or lobar arteries or their subdivisions. Not uncommonly, the kidneys receive aberrant arteries from the superior mesenteric, suprarenal, testicular, or ovarian arteries. True accessory arteries