Contrast-induced nephropathy in cancer patients undergoing CT before and after injection of iodinated contrast nonionic low osmolar

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Aims and objectives

PRIMARY OBJECTIVE

The main objective of this study is to assess renal function in cancer patients undergoing computed tomography before and after the use of iodinated contrast media of low osmolarity, through measurement of serum markers of kidney injury, in order to identify the incidence rates CIN.

SECONDARY OBJECTIVES

1. The study aims to correlate laboratory data related to renal function in investigating the CIN.
2. This study also aims to correlate the occurrence of CIN specific demographic, clinical and oncological aspects.
Methods and materials

This is a prospective study in which a group of 239 outpatients underwent CT using injection of iodinated contrast osmolar, when it was made the analysis of serum creatinine, C-reactive protein (CRP), cystatin C and microalbuminuria in isolated urine samples assayed in both pre-contrast and in the post-contrast. All tests were performed by the Laboratory of the AC Camargo Cancer Center, as well as the CT, the Department of Imaging located in the same institution.

Each patient underwent contrast CT was at the request of your physician, since the exam is routine for staging, follow, or the evolutionary or remissive control of their disease. Contrast CT was not performed in any patient solely for the purposes of this research. The tests were performed according to routine Image Department at no cost, volume or additional risk related to the use of contrast to this study.

Upon arriving at the Department of Imaging for the realization of CT, the patient received a questionnaire for authorizing the infusion of iodinated contrast. In this questionnaire no information about the conditions of their general condition, authorizing the administration of contrast. The patient had to be within the specifications of the protocol internal Department of Imaging for contrast injection in order to ensure the safety of the procedure. The same protocol indicates the solid fasting for at least 4 hours before the test contrasted, but provides for the release and encourages fluid intake during this period. To show interest in participating in the study, patients received the Statement of Consent, containing general information about the project, the procedure for the collection of biological material and the receipt of the laboratory report containing results of examinations performed.

Soon after venipuncture for the infusion of iodinated contrast made by the Department of Nursing Image, took up the same puncture in order not to cause discomfort to the patient, and yielded a sample of venous blood in a dry tube without any anticoagulant for the tests. It has also asked the patient who is collecting a urine sample in a sterile vial, directing him to despise the first jet of urine for determination of microalbuminuria in the isolated sample. These samples collected before contrast administration were referred by nursing Department of Imaging the Clinical Laboratory, along with medical request for serum creatinine analysis, C-reactive protein (CRP), cystatin C and microalbuminuria in spot urine sample pre-contrast.

The patient was released after completion of CT and walked back to the institution within 48 to 72 hours, and head to the Clinical Laboratory site for second sample collection, both urine and blood, without having to wait. The same tests performed on pre-contrast were made in post-contrast (serum creatinine, C-reactive protein(CRP), cystatin C and microalbuminuria in spot urine sample.

The test results obtained before and after contrast administration, were used to assess individual rates of change, correlations and determining the incidence of CIN.

Reference Value:
For this study the reference values, based on the presented studies and methodologies used for each test were adopted. The reference values were:

- Cystatin C: 0.6 to 1.0 mg / L
- Serum Creatinine: 0.6 to 1.5 mg / dL
- Microalbuminuria: 30mg/ga 300 mg / g creatinine
- C-reactive protein (CRP): up to 0.50 mg / dL
- Urinary Creatinine: from 0.2 to 3.5 g / L
- The Estimated Clearance in MDRD formulas, Crockoft Gault and Cystatin C Larsson was calculated in accordance with their respective formulas.

Was used as a reference for the results to international standards proposed by the National Kidney Foundation of London, 5 stages of CKD related to GFR (NKF 2002) have been defined.
Results

The study included a total of 239 patients aged between 14 and 82 years (mean = 53.4 years, standard deviation = 14.8 years, median = 56 years). Among the 239 participants, 138 (57.7%) are female. The collection time ranged from 30 hours to 98.4 hours (mean = 59.2 hours, standard deviation = 14.6 hours, median = 61 hours). The most frequent type is malignant neoplasm of the breast, with 38 cases, and the second most common malignant neoplasm of the colon is, with 34 cases. These two types together account for 30% of all cases. Of the 239 patients, 168 (70.3%) were undergoing treatment with anticancer drugs. Among these 168 patients who underwent treatment with anticancer drugs, 98 (58.3%) were performing treatments with anticancer drugs during participation in research. Of the 239 patients who started the study, 15 (6.3%) did not return to the post-contrast collection. Table 1 shows the descriptive statistics of the results of pre- and post-contrast and comparison between these two sampling times. From this table it appears that the values in mg / dL of creatinine were significantly higher in post-contrast as well as the values of urinary creatinine.

The values of microalbuminuria, estimated clearance (Cockroft-Gault and MRDR) were significantly lower in the post-contrast, compared with the pre-contrast Table 1. For other examinations no significant differences between the values of pre-and post-contrast were found. Tables 2-4 show the distribution of patients according to the international standardization of NKF 2002 for glomerular filtration rate by the MDRD formulas, Cockroft-Gault and Cystatin C (Larsson). Among the 223 patients with creatinine test results, both pre and post-contrast, there was contrast-induced (increase of 25% or more) nephropathy in 22 patients (9.9%, 95% CI = [6, 3%, 14.6%]). The mean of this variable was 4.6%, ranging between -51.3% and 70.8% (SD = 16.7%, median = 1.9%).
Table 1: Table 1 - Descriptive statistics of pre-test and post-contrast and result (p-value) of the comparison between the times.

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Table 4: Table 2: Frequency and percentage of patients in each of the stages of GFR Cockcroft & Gault second in the pre-and post-contrast

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Table 3: Table 3: Frequency and percentage of patients in each of the stages of glomerular filtration rate MDRD second in the pre-and post-contrast.

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<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>GFR (ml/min/1.73m²)</th>
<th>Pre n</th>
<th>%</th>
<th>Post n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kidney damage with normal or increased GFR</td>
<td>≥ 90</td>
<td>120</td>
<td>53.8</td>
<td>102</td>
<td>45.7</td>
</tr>
<tr>
<td>2</td>
<td>Slight decrease in GFR</td>
<td>60-89</td>
<td>89</td>
<td>39.9</td>
<td>101</td>
<td>45.3</td>
</tr>
<tr>
<td>3</td>
<td>Moderate decrease in GFR</td>
<td>30-59</td>
<td>13</td>
<td>5.8</td>
<td>20</td>
<td>9.0</td>
</tr>
<tr>
<td>4</td>
<td>Severe decrease in GFR</td>
<td>15-29</td>
<td>1</td>
<td>0.4</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>5</td>
<td>Renal failure</td>
<td>&lt; 15 or dialysis</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 2: Table 4: Frequency and percentage of patients in each of the stages of the second GFR cystatin C (Larsson) pre-and post-contrast

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Conclusion

1. Renal function of cancer patients was normal when evaluated with markers in this study. When respected the dose and type of contrast agent used. No significant renal damage was observed related to the use of iodinated contrast medium of low osmolarity. Characterized thereby the contrast medium used. Safe for use in cancer patients.

2. When renal function was assessed by the value of Serum Creatinine and calculating the estimated clearance and the MDRD formulas Cocroft - Gaut, Cystatin C and clearance estimated by the formula Larsson, the sole criterion of RCN believes that the increase in serum creatinine percentage, there change that is not reproduced clinically and were not accompanied by Cystatin C, microalbuminuria, CRP and urinary creatinine. The set of all these markers allowed affirm that despite variations in methodologies non-renal damage was observed caused by iodinated contrast media of low osmolarity.

3. No clinical variable correlated with markers of absolute variables. Patients undergoing anticancer treatments, patients with metastasis, patients with a single kidney and in condition to receive iodinated contrast media of low osmolarity, showed no deficit.
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References


