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INCIDENCE AND RISK FACTORS FOCUSING ON RADIOLOGY: REACTIONS AFTER EXPOSURE TO NON-IONIC CONTRAST MEDIA

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ABSTRACT

Computed tomography (CT) imaging has rapidly become a commonplace diagnostic tool due to its utility in a wide range of diseases. To prospectively evaluate the incidence of reactions after exposure to Non-Ionic Contrast media (NICM), and to identify potential risk factors, with a focus on fasting duration for solid food and fluids, separately. **Methods:** From July to October 2017, 229 patients (117 men, 112 women; median age, 53.2 years; range, 04-90 years) undergoing ICM-enhanced CT were included in this study. Reactions after exposure to ICM exposure were assessed on a 3-point scale (mild, moderate, severe). Patients' characteristics and the fasting duration were evaluated to identify risk factors using logistic regression analysis. **Results:** Of the 229 patients, 8 experienced hypersensibility reaction, no patients experienced vomiting. Multi-variate regression analysis revealed that a history of drug hypersensitivity (3.49%) was independent risk factors for nausea. Of the patients who presented hypersensitivity reactions, 12.5% were diabetic, 12.5% had asthma, 50% had systemic arterial hypertension, 50% had dyslipidemia, 0% had renal disease, 25% had no associated alterations (asthma, hypertension, diabetes, dyslipidemia, renal diseases. **Conclusions:** The adverse reactions to ICM agents were consisting in predictors analyzers like an allergic history to contrast agents, diabetic, asthma, systemic arterial hypertension, dyslipidemia, renal disease and urticaria, history of the previous allergy

to drugs other than contrast agents. ICM Hypersensitive reactions occurred in 1.31% of patients. Our results showed that clinical decision based on patient clinical records resulted in a decrease of several immediate reactions incidence.

KEYWORDS: Hypersensitivity reaction, iodinated contrast media, non-ionic contrast media, case report, clinical history.

INTRODUCTION

Computed tomography (CT) imaging has rapidly become a commonplace diagnostic tool due to its utility in a wide range of diseases. Patients are frequently asked to fast prior to iodinated contrast media (ICM)- enhanced computed tomography (CT).[1,2] A national survey in the United States estimates that approximately 70 million CT scan are performed per year.[3] In Japan, the number of CT scans performed is not only substantially higher than in other countries but continues to increase.[4,5] Previous study reported the number of CT scans performed was about 36,550,000 times a year.[6] As the number of CT scanners increases, the number of diagnostic CT imaging studies increases as well as their side effects, including iatrogenic cancer[7] and adverse events from iodine-containing contrast agents.[8,9]

With the introduction of nonionic low-osmolality ICM, the reported frequency of immediate reactions (Like vomiting) has declined with varying range, from 1% or less to 11.7%, lessening the rationale of the fasting.[1,10,14]

Symptoms of an adverse reaction to contrast agents are diverse ranging from flushing, pruritus, urticaria, and angioedema[15], with more severe side effects including hypotension, loss of consciousness, to potentially life-threatening bronchospasm and airway obstruction.[16] These adverse events are hypersensitivity reaction, and classified into allergic reactions and non-allergic reactions author reply[17], the former, dependent on[18], and the latter, independent on dose and infusion rate.[19] Juchen and Dall´Agnol 2007 study about immediate adverse reactions to intravenous iodinated contrast media in hospitalized patients submitted to computed tomography at a teaching hospital in the South of Brazil. During the study period, all adverse reactions showed mild intensity, at a frequency of 12.5% with ionic iodinated contrast media, and 1% with non-ionic contrast agent. The extravasation of contrast occurred in 2.2% of the injections in a peripheral vein without complications in any of the cases.[20] In this study, we focused on all kinds of adverse events for contrast agent for CT scans. Risk factors for these adverse effects have been reported in previous literature, with a

history of immediate adverse reaction to contrast agents being the most significant. A history of allergy-mediated disease, including asthma, atopic dermatitis, and urticaria, is also considered a significant risk factor.

METHODS

A retrospective cohort study of all patients who underwent contrast-enhanced CT imaging with contrast agents from July through October 2017 was conducted at patients undergoing clinical therapy in Department of Radiology at, in Catanduva-SP, Brazil. All potential prognostic prediction parameters were collected prior to imaging and were based on previous studies, as well as physician-driven clinical relevance. Parameters were composed of patients' 1) demographic data, 2) administered contrast agents, 3) allergic history, 4) medical history, and 5) immediate hypersensitive reactions. If patients underwent more than one CT scan during the study period, only the most recent data were included. Demographic data included gender and age. Data on contrast agents included a type of the agent, contrast agent concentration, and total contrast agent dose.[21] Allergic history included any history of antibiotics or any other drug.[15,22] Medical history included atopic dermatitis, renal disease, urticaria, asthma, hypertension, diabetes, and dyslipidemia.[15,23] Adverse reactions to contrast agents are defined based on the previous study.[24] Acute reactions which occur immediately during the injection of the contrast agents up to one hour afterwards were observed and documented by a trained radiologist or nurse in charge of the examination for several hours after imaging. Non-acute (delayed) reactions occur more than one hour after the injection of the contrast agent. After discharge, patients were followed up at home for any reactions occurring within 24 hours of contrast administration by self-reporting. Albeit infrequent, severe adverse reactions involving prolonged hypertension, angina, ventricular fibrillation, based on the previous study.[25] We analyzed all kinds of these adverse reactions.

Statistical Analysis

Descriptive statistics were employed to characterize subjects' baseline data. In order to facilitate the use of the prediction rule in the clinical setting, continuous values were categorized into groups. Following the methodology of previous studies, laboratory test results and continuous values were dichotomized based on average values.[26] Continuous variables were expressed as mean ± standard deviation (SD). Categorical variables were expressed by percentages. The Student's t-test was used to compare quantitative variables. The values of $p < 0.05$ were considered statistically significant. Statistical analysis was

performed using the GraphPad Prism 5 Software for Windows. Ethical approval was obtained from the Research Ethics Committee of Faculdades Integradas Padre Albino, Catanduva-SP, Brazil (n°: 1.219.448).

RESULTS AND DISCUSSION

Patient profiles

Two hundred and twenty-nine patients were studied in this work and separated into two distinct groups. The group 1 consisted of 204 with NICM, while the group 2 consisted of 25 patients that received ICM and 24% from these patients were re-exposed to ICM. The proportion of men in the studied population was 48.52 and 72% for group 1 and 2 (Figure 1) and the mean age of the studied population was also similar for the two groups which were in the range of 53.2 years old (Figure 2).

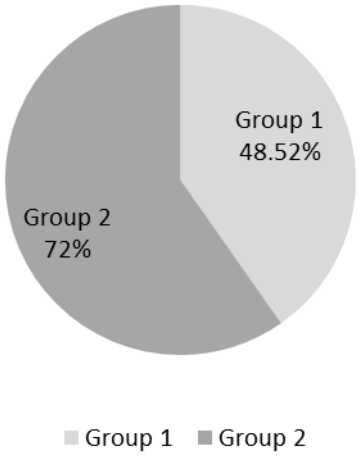

Figure 1: Proportion of men in the study.

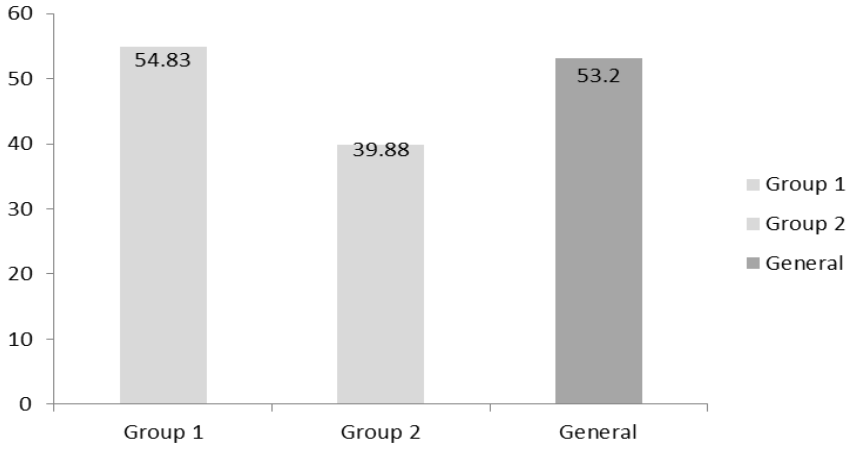

Figure 2: Range age groups.

Immediate hypersensitivity reaction

Most importantly to prevent immediate hypersensitivity to ICM include the clinical history of previous immediate reaction to ICM.[27] According to the literature, the term "iodine allergy" describes four different conditions such as allergy to ICM, allergy to disinfection, allergy to amiodarone and/or seafood (crustaceans or fish).[28,31] Herein, the first question to be addressed was the analysis of the term and diagnosis of "iodine allergy" and it was evidenced an inexact, insufficient and imprecise documentation for diagnosis of iodine allergy. Only 1,31% of the patients (considering all studied groups) were documented to ICM allergy. Hypersensitivity reactions after application of both ICM and NICM contrast were evaluated considering all patients studied and 5 patients from Group 1 (0,98%) experienced hypersensitivity reaction while only 3 patient from Group 2 (12%) experienced a grade I reaction to ICM. Furthermore, medical history included atopic dermatitis, renal disease, urticaria, asthma, hypertension, diabetes, and dyslipidemia were demonstrated at Table 1. Acute reactions and Non-acute (delayed). Albeit infrequent, were analyzed all kinds of these adverse reactions.

Table 1: Checklist of baseline parameters.

	Yes (%)	**No (%)**
Hypersensitivity Reaction	3.49	96.5
Already used ICM before	42.79	57.2
Asthma / Bronchite	3.93	96.06
Cardiac	6.98	93.01
Systemic Arterial Hypertension (SAH)	40.61	59.38
Renal Disease	3.05	96.94
Diabetic	14.84	85.15
Dyslipidemia	8.29	91.7
Gender	Male(%)	Female (%)
	51.09	48.9
Type of contrast	ICM (%)	NICM (%)
	10.91	89.08

Our group studied in recent about the immediate hypersensitivity to iodinated contrast media or non-ionic contrast reduced by clinical history, and they observed that the prediction rule may facilitate the pre- and post-imaging management of patients requiring contrast-enhanced CT imaging. For instance, physicians can consider whether they prescribe pre-medications for high-risk patients based on the rule. In other examples, physicians may choose the perform CT scans without contrast agent. Finally, physicians can evaluate which patients they should observe carefully and for a long time after CT scans.[32]

CONCLUSION

The adverse reactions to ICM agents were consisting in predictors analyzers like an allergic history to contrast agents, diabetic, asthma, systemic arterial hypertension, dyslipidemia, renal disease and urticaria, history of previous allergy to drugs other than contrast agents. ICM Hypersensitive reactions occurred in 1.31% of patients and none vomited in our study population. The results are within the limits cited in the international literature and suggest that tomography service professionals should know their own rates of adverse reactions to iodinated contrast agent, as well as the conditions in which they occur, in order to obtain evidence to evaluate the respective care delivery processes. However, in our study, few patients had documented clinical history of immediate response to ICM and they received a premedication before re-exposure to ICM or even received ICM replacement by NICM. In conclusion, our results showed that clinical decision based on patient clinical records resulted in a decrease of several immediate reactions incidence.

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