

## **Mechanical injection of contrast media through central venous catheters and central venous catheters of peripheral insertion (PICC) for tomographic studies**

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## Purpose

Little has studied the effect of the contrast injection by mechanical central catheters currently found most in vitro studies, which have shown that speeds as high as 14ml/sec occurs no deterioration of the catheter. Although in vivo studies have also been developed, reaching speeds of only 2.5 ml / sec. Most catheters are not manufacturers provide guidance on the use of power injectors in these catheters (1).

Currently the majority of existing studies in relation to the speed of injection, are in vitro, which show that only at speeds as high as 14 ml / sec may be a risk of damage to the catheter and 17 ml / sec rupture this (5-7,9,16), these rates are much higher than those necessary to conduct a tomographic angiography or contrast. The in vivo studies using very low injection rates (2 - 2.5 ml / sec), (10,17), which are not optimum speeds for some studies, especially angiotomography.

The purpose of this study is to demonstrate the power injection of contrast medium through central lines at speeds > 3 ml / sec is safe and allows good quality studies.

## Methods and Materials

A study descriptive, longitudinal and prospective patients hospitalized in the Hospital Universitario San Vicente Foundation of the city of Medellin, Colombia from March 2010 until March 2012.

Inclusion criteria were: patients older than 18 years who had only venous access as a centerline and whose renal function was normal, or creatinine clearance 30 to 60 ml / min, depending upon local protocol nephroprotection, patients with renal CKD who were on hemodialysis or peritoneal dialysis.

Exclusion criteria were: patients who had doubts about the integrity and correct positioning of the catheter, Swan Ganz catheters, hemodialysis and chemotherapy ports.

Patients with previous allergic reactions to contrast médium.

### **Procedure:**

Were recorded respective demographic and clinical data (Appendix 2) and the patient was transferred to the scanner, where images were obtained in 64-detector multislice CT scanner GE LightSpeed VCT XT based on the protocol established for the respective disease or diagnostic impression. Was administered soluble iodinated contrast medium at concentrations of 300 and 350 mg / mL (for angiotomography) through a mechanical injector 300 PSI for all patients, recording speeds at which this injection is performed.

We performed the noninvasive monitoring of vital signs before, during and after contrast medium injection and recorded any complication in the format intended for it. Records were evaluated blood pressure (SBP, systolic and diastolic, DBP), pulse oximetry and manifestations and that might suggest contrast reactions, such as nausea, vomiting, rash, pruritus, dyspnea, anaphylaxis, cardiac arrest, among others, which were monitored during and until 1 hour after administration of contrast.

Prior to injection of the contrast was confirmed adequate permeability and intravascular position of the catheter, initially administering saline, which was injected through the catheter manually without difficulty and achieving adequate blood return. If there is doubt about the integrity and correct positioning of the catheter, the patient was excluded for injection.

Were evaluated catheter related complications in terms of possible malfunction, with subsequent difficulty in the drug or liquid passage, occlusion, thrombosis, and total or partial rupture in case of the rupture site, and possible embolization the distal fragment. We reviewed medical records and contacted the nurse manager to detect the difficulties presented with the catheter up to 24 hours after power injection of contrast.

### **Statistical analysis:**

Statistical analysis of the data were used frequency distributions, when the variables were qualitative, and summary measures of central tendency and for quantitative, after checking with the Shapiro Wilk test distribution. Additionally analysis was performed for comparison of related samples if significant differences in pulse oximetry and patients from its baseline, during the time of injection and until 1 hour after being injected, for which test was used the Wilcoxon rank due to the non-normal distribution of quantitative variables involved. To evaluate changes in blood pressure values of each patient, we used the McNemar test, grouping as normal SBP values between 90 and 140 mmHg and DBP between 60 and 90 mmHg, and not as normal values, which found outside this range.

## Results

Hospitalized patients were included in the Hospital Universitario San Vicente Foundation, the city of Medellin, Colombia.

Of the 55 patients included in the study, 26 were women (47.3%) and 29 men (52.7%), with a median age of 53 years (18-85 years) (Figure 1). Personal history, 20 patients (36.4%) had hypertension, 11 patients (20%) were diabetic, 2 patients with coronary artery disease (3.6%), 2 with a history of arrhythmias (3.6%) and 2 with prior history of allergic reactions, and penicillin one another to tramadol (3.6%).

There were no complications related to the patient within one hour after injection of contrast, evaluating outbreak, pruritus, dyspnea, anaphylaxis, nausea, vomiting, cardiac arrest, among others.

In assessing the patient's vital signs before, during and up to 1 hour after injection of the contrast medium, are the following results:

There were no significant changes in the values of blood pressure, pulse oximetry and patients when comparing baseline and post-injection (Figure 1 and Figure 2).

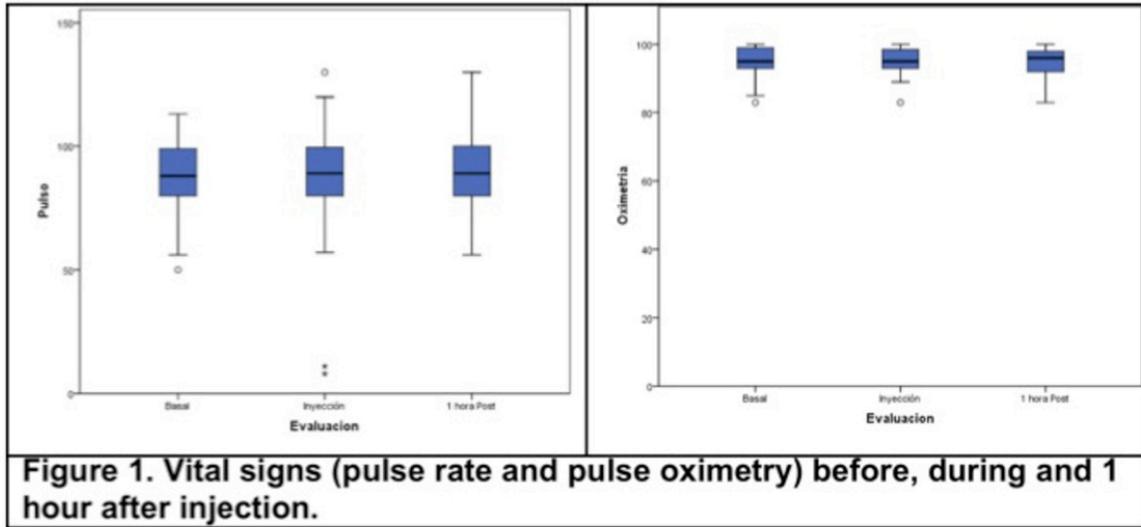
Images for this section:

Table 1. Changes in blood pressure values of patients								
Systolic Blood Pressure		PAS post				Total		Value p*
		Normal		Not normal				
		Nro.	%	Nro.	%	Nro.	%	
<b>SBP basal</b>	Normal	28	87,5%	4	12,5%	32	100%	0,118
	No normal	11	47,8%	12	52,2%	23	100%	
<b>Total</b>		<b>39</b>	<b>70,9%</b>	<b>16</b>	<b>29,1%</b>	<b>55</b>	<b>100%</b>	
<b>SBP previous</b>	Normal	33	86,8%	5	13,2%	38	100%	1,000
	Not normal	6	35,3%	11	64,7%	17	100%	
<b>Total</b>		<b>39</b>	<b>70,9%</b>	<b>16</b>	<b>29,1%</b>	<b>55</b>	<b>100%</b>	

\* McNemar test

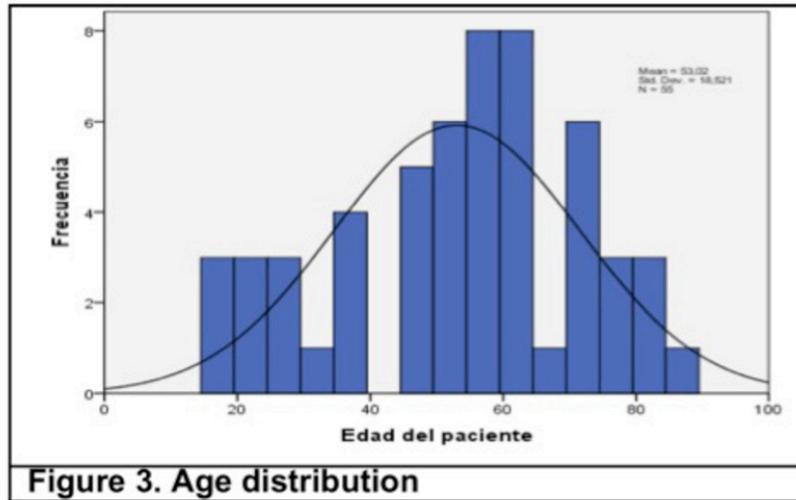
**Table 1:** Table 1. Changes in blood pressure values of patients

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**Fig. 1:** Figure 1. Vital signs (pulse rate and pulse oximetry) before, during and 1 hour after injection.

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**Fig. 2:** Age distribution

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## Conclusion

In conclusion we can say that using our results could improve the ability to access imaging studies in all patients without peripheral venous access and who have only a central venous access, prescribed precautions being able to inject with speeds above 3 cm / sec.

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