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PERCUTANEOUS INTERVENTION VIA RADIAL AND HOSPITAL STAY TIME INTERVENÇÃO PERCUTÂNEA POR VIA RADIAL E TEMPO DE PERMANÊNCIA HOSPITALAR INTERVENCIÓN PERCUTANEA POR VÍA RADIAL Y TIEMPO DE PERMANENCIA HOSPITALARIA

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ARSTRACT

Objective: to analyze the risk factors related to the percutaneous radial procedure and length of hospital stay. *Method:* quantitative, longitudinal, prospective, descriptive and unicentric study. Data was collected through a questionnaire, with 100 patients, in three phases (pre-procedure, transprocedure and post-procedure), in 24 hours and after seven days. For the quantitative variables, the Mann-Whitnney or Student's t tests were used; for the qualitative, Fisher's exact test. For the association between two quantitative variables, the Pearson correlation coefficient was used with significance level ≤5%. *Results:* 100 patients had the procedure with mean hospitalization of 6.6 days. After the association between the length of stay and clinical variables, p did not show significant value. *Conclusion:* the results are closer to the reality of the hospitals of the Unified Health System; there was no linearity in the length of hospital stay when associated with different factors related to the percutaneous intervention. *Descriptors:* Percutaneous Coronary Intervention; Length of hospitalization; Radial Artery; Unified Health System; Acute Coronary Syndrome; Risk Factors.

RESUMO

Objetivo: analisar os fatores de risco relacionados ao procedimento percutâneo por via radial e o tempo de permanência hospitalar. *Método*: estudo quantitativo, longitudinal, prospectivo, descritivo e unicêntrico. A coleta de dados foi realizada por meio de questionário, com 100 pacientes, em três fases (pré-procedimento, transprocedimento e pós-procedimento), em 24h e após sete dias. Para as variáveis quantitativas, foram utilizados os testes *Mann-Whitnney* ou *t de Student*; para as qualitativas, o teste exato de Fisher. Para a associação entre duas variáveis quantitativas, foi utilizado o coeficiente de correlação de Pearson com nível de significância ≤5%. *Resultados*: 100 pacientes realizaram o procedimento com média de internação de 6,6 dias. Após a associação entre o tempo de permanência e as variáveis clínicas, o p não mostrou valor significante. *Conclusão*: os resultados aproximam-se mais da realidade dos hospitais do Sistema Único de Saúde; não houve linearidade no tempo de permanência hospitalar quando associado a diferentes fatores relacionados à intervenção percutânea. *Descritores*: Intervenção Coronária Percutânea; Tempo de Internação; Artéria Radial; Sistema Único de Saúde; Síndrome Coronária Aguda; Fatores de Risco.

RESUMEN

Objetivo: analizar los factores de riesgo relacionados con el procedimiento percutáneo por vía radial y el tiempo de permanencia hospitalaria. *Método:* Estudio cuantitativo, longitudinal, prospectivo, descriptivo y unicéntrico. La recolección de datos fue realizada por medio de un cuestionario, con 100 pacientes, en tres fases: (pre-procedimiento, transprocedimiento y post-procedimiento), en 24h y después de siete días. Para las variables cuantitativas, se utilizaron las pruebas Mann-Whitnney o t de Student; para las cualitativas, la prueba exacta de Fisher. Para la asociación entre dos variables cuantitativas, se utilizó el coeficiente de correlación de Pearson con nivel de significancia ≤5 ‰. *Resultados:* 100 pacientes realizaron el procedimiento, con promedio de internación de 6,6 días. Después de la asociación entre el tiempo de permanencia y las variables clínicas, el p no mostró valor significativo. *Conclusión:* los resultados se acercaron más a la realidad de los hospitales del Sistema Único de Salud; no hubo linealidad en el tiempo de permanencia hospitalaria, cuando asociado a diferentes factores relacionados a la intervención percutánea. *Descriptores:* Intervención Coronaria Percutánea; Tiempo de Internación; Arteria Radial; Sistema Único de Salud; Síndrome Coronária Aguda; Factores de Riesgo.

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INTRODUCTION

Cardiovascular diseases (CVD) are the leading causes of death in developed and developing countries with rates of 26.6 and 28.7% of deaths, respectively. In Brazil, they represented one-third of all deaths and almost 30% of all deaths in the age group of 20 to 60 years of age in 2008. Among CVD, acute myocardial infarction (AMI) stands out due to the high number of deaths and hospitalizations, which generated high costs to the Health System.

The treatment of AMI has undergone important modifications in the last years, mainly by the implantation of protocols that lead to a fast and effective action of the emergency services. The choice of the pharmacological or mechanical reperfusion method depends on the possibilities of the available resources^{4,5} and the time between the occurrence of the event and the care.

Percutaneous Coronary Intervention (PCI) is the treatment of choice in AMI with segment elevation (AMI with SSST) ⁶ and presents better results with the evolution of antithrombotic therapy associated with the introduction of stents.

In Brazil, 90% of the procedures performed use the femoral artery as access and 8% the radial artery. The remaining 2% are done by brachial puncture. However, the femoral approach has limitations mainly related to vascular and hemorrhagic complications. The transradial approach has several advantages, due to the anatomical location of the radial artery, which provides easy compression, reduction of hemorrhagic complications, early ambulation, patient comfort and reduction of hospitalization costs.

In studies carried out in a public teaching hospital in the interior of São Paulo, it was concluded that the hospitalization time for patients with Unstable Angina was 12.5 days and ten days for patients with AMI. Among the complications that affected infarcted patients, cardiorespiratory arrest, cardiac arrhythmias and the procedures of PCI were more frequent.¹⁰

It is believed that, once the reasons that lead to the increase of hospitalization time in patients undergoing radial coronary stent implantation have been identified, preventive strategies can be implemented aiming at the recovery of these patients in a shorter period of time.

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OBJECTIVE

• To analyze whether the clinical variables related to the radial percutaneous procedure correlate to the length of hospital stay.

METHOD

A quantitative, longitudinal, prospective, descriptive and uni-centric study with 100 patients who had the PCI procedure electively, for the first time and by radial route, in a public institution with an academic profile.

In order to carry out data collection, the institutional flow was followed in which the patients, previously scheduled, attended the hospital 24 hours before the procedure. After structured admission, a questionnaire containing three parts was used. The first one, called the pre-procedure, contains demographic, epidemiological, clinical. laboratory, electrocardiographic data. medication in use, smoking and alcoholism. The second part, trans-procedure, with admission data, beginning and end of the exam and its characteristics, as well as the description of the intercurrences. The third was about the post-procedure, mainly the description of the intercurrences, the followup in 24h and after seven days.

To complete the data collection, seven days after discharge, patients were contacted by telephone and questioned about their clinical status and whether there were any problems related to the procedure. The same questioning was made to those still in detention. The study was approved by the REC of that institution under no. 442724.

The data was inserted into spreadsheets and analyzed in the form of descriptive and inferential statistics using the software Statistical Package for the Social Sciences (SPSS), version 19.0. In order to ensure the reliability of the results, the hospitalization time was analyzed qualitatively and quantitatively.

Thus, when the qualitative variable was considered, the cutoff point established for the length of hospital stay was less than five days. For the comparison of two groups less (patients with than five hospitalization time), the Mann-Whitnney or Student t tests were used in relation to the quantitative variables. For this comparison, in relation to the qualitative variables, Fisher's exact test was used. For the association between two quantitative variables, the Pearson correlation coefficient was used. A significance level of ≤5%.

RESULTS

During the study period, 229 procedures were carried out, and the 100 patients underwent coronary stent implantation for the first time, radially. Table 1 details the main

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clinical characteristics of the studied population showing a high prevalence of coronary artery disease (CAD), systemic arterial hypertension (SAH) and diabetes mellitus (DM) carriers.

Table 1. Demographic and clinical characterization of patients with coronary stent implantation. São Paulo (SP), Brazil, 2017.

Variabe	N	
Sex	·	
Male	69	
Female	31	
Age		
> 60 years	70	
<60 years	30	
Coronary Artery Disease	84	
Systemic Arterial Hypertension	64	
Diabetes Mellitus	63	
Type I (insulin dependent)	42	
DLP	27	
BMI		
18.5 to <25	28	
25 to <30	48	
30 to <35	19	
35 to <40	04	
≥ 40	01	
Previous Stroke	07	
Acute Myocardial Infarction	95	
* AMI without SSST	68	
* AMI with SSST	27	

Note: * AMI without SSST: Acute Myocardial Infarction Without Supra ST Tracking; * AMI with SSST: Acute Myocardial Infarction with Supra Following ST.

Table 2 shows the comparison of two groups of patients: in the first, patients who remained hospitalized for less than five days and, on the other, patients who were

hospitalized for five days or more. The variables associated between the two groups were: gender, age, body mass index, coronary artery and lesion size.

Table 2. Hospital stay rate of patients undergoing coronary stent implantation, according to time. São Paulo (SP), Brazil, 2017.

Variables	Hospitalization < 5 days		Hospitalization ≥ 5 days		p Value*
	N	%	N	%	
Male	24	70.6	45	68.2	1
> 60 years	22	64.7	48	72.7	0.49
BMI > 30	10	29.4	14	21.2	0.45
Coronary Artery Disease					
ADA	22	64.7	50	75.8	0.25
ACD	23	69.7	43	65.2	0.82
ACE	0	0	1	1.5	1
ACX	14	41.2	30	45.5	0.83
Size of the lesion					
< 40%	2	5.9	7	10.6	0.71
40 a 60%	13	38.2	32	48.5	0.39
61 a 70%	16	47.1	25	37.9	0.39
71 a 80%	15	44.1	22	33.3	0.63
81 a 100%	24	70.6	49	74.2	0.81

Note: * Fisher's exact test; ADA: Previous Descending Branch;

ACD: Right Coronary Artery; ACX: Circumflex Artery.

Table 3 correlated the length of the hospital stay and clinical variables. However,

it was observed that there was no significant correlation for these associations. It was also

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observed that the longer stay was among patients with lesion in the left coronary artery, with an average stay of eight days. On the other hand, the minimum stay in hospital was five days, recorded in those patients with intercurrences, but without relevant complications. It should be noted that significant values appeared in the association between those patients who presented coronary artery lesions smaller or greater than 71 to 80%.

Clinical feature	ulo (SP), Brazil, 201 s		Hospitaliz	ation in days	
		N	Average days of hospitalizatio n	Standard deviation	p Valu
Sex	Female	31	7.29	2.96	0.108
	Male	69	6.35	2.67	
Obesity	BMI < 30	76	6.70	2.83	0.678
	BMI > 30	24	6.46	2.67	
Kidney Failure	Yes	27	6.70	2.92	0.967
•	No	73	6.62	2.75	
Creatinine ≥ 1.5	Yes	09	6.22	3.19	0.568
Creatinine <1.5	No	91	6.68	2.75	
AMI with SSST	Yes	27	6.63	2.84	0.842
AMI without SSST	No	68	6.72	2.81	
ADA	Injury -	28	6.00	2.82	0.147
	Injury +	72	6.89	2.75	
ACD	Injury -	33	6.79	2.74	0.733
	Injury +	66	6.61	2.82	
ACE	Injury -	99	6.63	2.79	0.720
. 61/	Injury +	1	8.00		0.54
ACX	Injury -	56	6.46	2.67	0.568
6 1:19:	Injury +	44	6.86	2.93	0.50
Comorbidities> 3	Injury -	34	6.85	2.79	0.528
Industrial AO	Injury +	66	6.53	2.79	0.04
Injury <40	Injury -	91	6.66	2.82	0.94
Injury 40 to 60	Injury +	9	6.44	2.46	0.07
	Injury -	55 45	6.16	2.77	0.074
Indiana (1 to 70	Injury +	45 59	7.22 6.75	2.71 2.59	0.63
Injury 61 to 70	Injury - Injury +	41	6.49	3.06	0.631
Injury 71 to 80	Injury +	63	7.11	2.81	0.023
ilijuly / I to 60	Injury +	37	5.84	2.58	0.02.
Injury 81 to 100	Injury -	27	6.11	2.53	0.282
ilijury or to 100	Injury +	73	6.84	2.86	0.202
Double injury	Injury o -	77	6.70	2.77	0.820
Double Injury	Injury +	23	6.43	2.87	0.020
Triple injury	Injury o -	100	6.64	2.78	
Coronary Stem lesion	Injury -	90	6.5	2.3	0.71
co.onary sterri testori	Injury +	10	7.0	3.2	5.71
Bruise	No	96	6.60	2.80	0.513
Druise	Yes	96 4	7.50	2.80	0.51.
Eccymosis	No	97	6.64	2.32	0.909
	Yes	3	6.67	4.62	0.70
Complications	No	94	6.69	2.82	0.48
Complications	NU	74	0.07	2.02	0.40

Yes Note: Injury yes: (+); Injury not: (-); * Mann Whitney Test.

DISCUSSION

Although there are studies demonstrating that radial PCI has low complication rates, leading to a reduction in hospitalization time, this study shows that the hospital stay rate is remarkably heterogeneous.

Initially, the profile of the patients was characterized in terms of demographic and anthropometric data, well as

comorbidities presented, in order to associate them with the length of hospital stay, since the patients had differences between the severity of the coronary disease.

2.04

5.83

6

There was a predominance of males in the statistics from sample, confirming **National** Center for Cardiovascular Interventions (NCCI), ¹¹ despite the growing number of women affected by coronary

syndrome in recent years^{12,13} which corroborates this study.

The population of this study is in an average age range of 65.1 years. These results are like other findings that show a proportion of patients in this age group and who undergo PCI.^{3,14,15} In this age group, there is a prevalence of coronary diseases, with atherosclerosis as the main causal factor, which may be closely related to the presence of dyslipidemia and hypertension, both comorbidities occurring in this study, as well as diabetes and smoking.¹⁵ ¹⁶

Another aspect evaluated was weight, since the majority of the patients in this study were overweight (> 25 kg / m2).¹⁷ Considered an important modifiable risk factor, obesity is associated with the onset of heart disease and other chronic conditions such as SAH, DM and DLP. It is strongly associated with AMI, since abdominal fat is a predictor in the development of atherosclerosis. ^{17,18,19}

Regarding the type of acute coronary syndrome (ACS), the number of patients presenting AI without SSST was 68%, while 27% presented AMI with SSST, and all patients underwent the procedure. The number of hospitalizations and procedures associated with ACS, the Unified Health System (UHS) and the Supplementary Health System (SHS) in 2011 was 24,187 hospitalizations in patients with AMI with SSST and 73,803 in patients with AMI without SST, showing a higher occurrence of patients with AMI without SSST.²⁰

It was also observed in a study that evaluated the profile of the patients readmitted in a cardiovascular hospital, who in the first hospitalization was ACS, corresponding to 13.74% of the patients.¹⁷

The data presented here corroborate the literature revealing the predominance of patients with AMI without SSST when compared to those with AMI with SSST. In this study, all patients were submitted to elective PCI, therefore, procedures were excluded under emergency conditions for the examination.

Regarding the hospital stay, the mean time was 6.6 days and was not correlated with the complications occurred even though inherent to the coronary stent implantation procedure with the use of the radial artery as the access route.

By observing the data in table 2, no statistically significant characteristic was found to justify the length of hospital stay, although there are patients with complex characteristics such as extensive lesions ranging from 80% to 100%, BMI above 30 or

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obesity, and patients with coronary trunk lesion. These factors were not sufficient to interfere in the analysis of the hospital stay rate. National and international studies highlight the safety of hospital discharge on the same day of the procedure, or even the next day, for patients who underwent PAC without complications. ²¹⁻²⁸

A recent study, developed in Europe, compared the length of hospital stay of patients with ACS, with or without SSST, and concluded that the average length of hospital stay was 9.6 days and 4.1 days spent in ICU. ²⁷ National study indicated an average ten-day hospital stay for AMI patients. ¹²

The time of hospital stay for the performance of PCI in UHS hospitals, one of the largest public systems in the world, is, on average, five days, ^{10,11} lower values than those found in this study.

Although hospitalization time was associated with different variables in order to identify associated factors, such association was not proven. The greatest length of hospital stay was up to eight days for patients with ACE lesion; 7,11 days in patients with injury from 71% to 80%; 7.5 days in patients with coronary trunk lesion and 7.3 days in male patients. The shorter hospitalization time was identified in patients with lesions greater than 71-80%: 5.8 days.

From the point of view of Public Health, it is important to know the information about hospital stay since it involves costs, differences in results by hospitals and their regional peculiarities, as well as real impact on the health of the population, since the coronary disease has paper incidence of hospital beds in Brazil. The relationship between length of hospital stay and the procedure to which the patient was submitted influence the quality, costs can satisfaction of the patient undergoing treatment.12

A study carried out in Spain registered an important recurrence in the hospitalization, in the medium and long term, of patients diagnosed and hospitalized previously for AMI. The increase in hospital admission recurrence is related to the presence of risk factors for CVD and reduction of survival. Improvement of care during the hospitalization period and patient management in secondary prevention programs to this clientele should be encouraged in order to reduce hospitalization and increase quality of life.³⁰

In the study that analyzed the CENIC records referring to hospital outcomes of PCI in type C lesions characterized as high risk and

low success rates in the procedure, the mean hospital stay was 2.5 to 5 days in the 1,693 patients analyzed. The femoral access route was used in 85.3% of the procedures and the radial route in the other patients (14.7%).

A pilot study evaluated the feasibility and safety of discharge on the same day after successful PCI. Sixty-three patients with a diagnosis of stable angina and lesions of large secondary branches were selected. After the procedure, 50 patients (79%) were observed for two hours and considered eligible for hospital discharge, but remained hospitalized without monitoring until the next day. There was no ischemic event in this group of patients. In the group of patients selected for hospitalization, three had vessel occlusion and the changes occurred in two patients within one hour and after 20 hours. One presented occlusion after PCI. When the access site was evaluated, all were performed by brachial route and 6-F catheter. Bleeding at the puncture site occurred in five patients, and in two, there was a need for surgical repair. From this initial experience, the importance of defining ischemic risk after PCI should be a primordial and careful approach. 20

Another study evaluated 811 patients of the 943 patients with discharge on the same day after radial PCI, including patients with stable and unstable angina and simple and / or complex PCI. Among the patients, none presented greater complications at the access site. Six patients (0.6%) had subacute narrowing of the vessel, but none presented such complication during the first 24 hours after discharge. The hospital discharge on the same day of radial PCI in low-risk patients was considered a safe and viable strategy. ²⁴

In Brazil, few services consider the possibility of discharge on the same day, and consequently, the experiences reported are scarce. However, a uni-centric record made a retrospective evaluation of all patients who underwent elective PCI and who were discharged on the same day between January 2009 and March 2012³². In that study, 69 patients were detected in the database.

The clinical presentation included stable angina, growing angina without elevation of biomarkers or symptomatic for ischemia. The most frequent access route was radial (89%), femoral (3%) and brachial (7%). Conventional stents were used in 88% of cases. The success of the procedure occurred in 98.5% of the submitted sample, concluding for the safety of discharge the same day for low-risk patients, both clinical and angiographic, who underwent elective PCI and who progressed

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without complications associated with the procedure. ³²

This study reveals that complications of vascular access and contrast nephropathy, when present, contribute to prolonged hospitalization. However, the development of interventional cardiology, the improvement of techniques and medications, and the tendency for elective PCI to progress to a shorter hospital stay. Many hemodynamic services, including in Brazil, use the radial access route, ^{16,33} but lack studies that show the time of hospital stay post-procedure.

The process of discharge on the same day is relatively simple when there is technical security and a structured program. The challenges of such a large-scale program are not only to ensure patient safety and logistics in the short term, but also global aspects to improve patient satisfaction, speed return to work, and minimize costs to the health system.

CONCLUSION

This result indicates the need for further studies in order to identify the variables that determine the time of hospitalization, since the intercurrences were not enough to support it. This factor would benefit the patient, the health system, public or private, would increase bed rotation and reduce costs. However, the safety of hospital discharge should be estimated by the health team, not neglecting the analysis of the clinical data in favor of the procedure. In addition, length of stay may also be related to multifactorial issues such as the decision of the medical team, the work plan of the medical staff in a public hospital and other reasons not recorded in the medical records, which would require further investigation.

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