ORIGINAL ARTICLE

Implementation of an Ambulatory Percutaneous Coronary Intervention Program in Higher Risk Patients

Implementación de un programa de angioplastia coronaria ambulatoria en pacientes con riesgo incrementado

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ABSTRACT

Background: The implementation of ambulatory percutaneous coronary intervention (APCI) programs in patients with elective treatment is a feasible and safe strategy. However, the information about its implementation for same-day discharge after the procedure in higher risk patients is limited.
Objective: The aim of this study was to evaluate the safety and feasibility of an APCI program for same-day discharge in elective higher risk patients.
Methods: This was an observational, single-center study including patients who underwent elective percutaneous coronary intervention between January 2009 and March 2017. The safety of the intervention in APCI patients (intervention cohort) was evaluated against a preintervention cohort of elective patients assessed between January 2009 and October 2015. To evaluate feasibility, the intervention cohort was divided into two groups according to hospital stay: patients discharged on the same day of the procedure (same-day discharge group, SDDG) and those with overnight hospitalization (hospitalization group, HG).
Results: The study included 3,663 patients, among which 2,422 presented higher risk for APCI in the preintervention cohort and 661 in the intervention cohort. The prevalence of death/acute myocardial infarction/stroke at 7 days was similar in both groups (intervention cohort 0.5% vs. preintervention cohort 0.5% (HR 1.04, 95% CI 0.29-3.75; p=0.94). No differences were observed in the need for rehospitalization (intervention cohort 0.9% vs. preintervention cohort 1.7% (HR 0.53, 95% CI 0.22-1.27; p=0.15). In the feasibility analysis, the SDDG represented 52.1% of the intervention cohort, with a significant 73% length of stay reduction (HG 19.4 h, IQR 17.22-22.7 vs. SDDG 7.27 h, IQR 5.8-9.1; p<0.0001) and 23% cost reduction. The length of hospital stay in the SDDG increased in APCI patients with higher risk factor (RF) burden: 1 RF: 6.8 h, IQR 5.6-8.1; 2 RF: 7.1 h, IQR 5.7-9.02; ≥3 RF: 7.7 h, IQR 6.4-11.5; ptrend 0.002. In the HG, the causes for overnight observation were: 30.4% comorbidities, 20.3% complex interventions and 23.4% social causes.
Conclusion: The implementation of our APCI program in this population of patients was associated with similar rates of major events and rehospitalization than that of patients undergoing a standard procedure. The reduction in hospital length of stay and costs could have a favorable impact on the institution's operative efficiency.

Keywords: Coronary Angioplasty - Ambulatory Care - Ambulatory Surgical Procedures/economics.

RESUMEN

Introducción: La implementación de programas de Angioplastia Ambulatoria (AA) en pacientes tratados en forma electiva surge como una estrategia factible y segura. Sin embargo, la información sobre su implementación en pacientes con riesgo incrementado para el alta el mismo día del procedimiento, es limitada en la actualidad.
Objetivo: Evaluar la seguridad y la factibilidad de un programa de AA en pacientes programados con riesgo incrementado para alta precoz.
Material y métodos: Estudio observacional, unicéntrico que incluyó pacientes tratados con angioplastia coronaria electiva entre enero 2009 y marzo 2017. Para evaluar la seguridad de la intervención se comparó la cohorte de pacientes electivos comprendida entre enero 2009 - octubre 2015 (cohorte preintervención) con los pacientes incluidos en el programa de AA desde su inicio en noviembre 2015 - marzo 2017 (cohorte intervención). Para evaluar la factibilidad se dividió la cohorte intervención en dos grupos según el tiempo de internación: los que fueron dados de alta el mismo día (grupo alta precoz, GAP) y los que continuaron su hospitalización hasta el día siguiente (grupo hospitalización, GH).
Resultados: Se incluyeron 3.663 pacientes, de los cuales 2.422 presentaban riesgo incrementado para AA en la cohorte preintervención y 661 en la cohorte intervención. La prevalencia de Muerte/IAM/ACV a los 7 días fue similar en ambos grupos (cohorte intervención 0,5% vs. cohorte preintervención 0,5% (HR 1,04, IC 95% 0,29 – 3,75), p = 0,94. No se observaron diferencias en la necesidad de rehospitalización (cohorte intervención 0,9% vs. cohorte preintervención 1,7% (HR 0,53, IC95% 0,22 – 1,27, p = 0,15). En el análisis de factibilidad, el GAP representó el 52,1% de la cohorte intervención, con una reducción significativa del 73% del tiempo de hospitalización (GH 19,4 h, RI 17,22 – 22,7 vs. GAP 7,27 h, RI 5,8 – 9,1, p < 0,0001) y un 23% en los costos. El tiempo de internación en

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el GAP se incrementó con la mayor carga de factores de riesgo (FR) para AA: 1 FR: 6,8 h, RI 5,6 – 8,1, 2 FR: 7,1 h, RI 5,7 – 9,02, ≥ 3 FR: 7,7 h, RI 6,4 – 11,5, ptrend 0,002. En el GH las causas de observación hasta el día siguiente fueron: 30,4% comorbilidades, 20,3% intervenciones complejas y el 23,4% causas sociales.

Conclusión: La implementación de nuestro programa de AA en esta población se asoció a similares tasas de eventos mayores y de re-hospitalización que en los pacientes abordados de forma estándar. La reducción evidenciada en los tiempos y los costos de internación podrían impactar positivamente en la eficiencia operativa de la institución.

Palabras clave: Angioplastia coronaria – Atención Ambulatoria - Procedimientos Quirúrgicos Ambulatorios/economía

Abbreviations

ACS	Acute coronary syndrome	**HG**	Hospitalization group
AMI	Acute myocardial infarction	**PCI**	Percutaneous coronary intervention
APCI	Ambulatory percutaneous coronary intervention	**SDDG**	Same-day-discharge group

INTRODUCTION

The marked worldwide exponential increase in the number of percutaneous coronary interventions (PCI) performed per center is associated with elevated costs for the healthcare system, as well as with logistic restrictions for institutions, both in appointment scheduling of ambulatory patients as in admission of acute coronary syndromes (ACS).

In response to this demand, ambulatory percutaneous coronary intervention (APCI) programs have been developed with suitable safety, efficacy, cost reduction and greater patient satisfaction results. (1-4)

In 2009, the Society for Cardiovascular Angiography and Interventions (SCAI) postulated a set of criteria to guide decision-taking regarding the length of hospital stay in each patient. (5) This document describes certain clinical and angiographic variables conferring higher risk for APCI.

Despite promising results obtained in randomized studies and observational registries, patients included in APCI programs represent a minor percentage of the overall potential. This is due to the multiple baseline, anatomical and procedural technique characteristics that place the patient in a higher risk group for APCI, which is even reflected in the current practice. (4, 6, 7)

At the same time, the progress in medical treatment and the greater development of PCI devices have refined this technique to attain predictable short- and mid-term results. (8-10)

Consequently, the aim of this study was to report the results of our APCI program in higher risk patients, focusing on the safety and feasibility of this approach in our setting and according to current PCI standards.

METHODS

An observational, single-center study was performed on elective patients with at least one high risk variable for APCI according to SCAI criteria (5), who underwent, either direct or ad hoc PCI, between January 2009 and March 2017. Patients coursing an ACS, those with standard risk profile according to SCAI guidelines (5) or major complications during index hospitalization (death, acute myocardial infarction, stroke, major access complications or major bleeding) and patients living more than 120 minutes from the institution were excluded from the study.

Description of the ambulatory percutaneous coronary intervention program

All patients evaluated for elective PCI who were candidates to receive a same-day discharge strategy were included in the APCI program. This was called the "intervention cohort". Hospitalized patients did not present need of medical interventions associated with the underlying pathology or for problems related with the procedure.

The APCI program in our center responds to the following procedure: All patients are evaluated in a previous visit by the operating physician, who takes the clinical history and requests the necessary complementary studies. In this instance, the patient receives an informed consent for the procedure and the corresponding information on the APCI program. The patient is indicated to take double antiplatelet therapy (acetylsalicylic acid-clopidogrel) during five days prior to the intervention. On the day of the procedure, the patient is admitted in an ambulatory area with nursing care, vital signs monitoring, electrocardiogram, insertion of a peripheral intravenous catheter and certification of the medical history by a cardiologist. Following PCI the patient remains monitored for a minimum of 6 hours, ending with a clinical cardiologist's evaluation, including interrogation, physical exam, postprocedural electrocardiogram and puncture site assessment.

After discharge, the patient has access to a 24-hour active cellphone to communicate with a proficient person at the institution (hemodynamics specialist nurse) in case doubts or problems arise. All patients have a control appointment in the outpatient clinic with the operating physician 7 to 10 days after the procedure.

Outcomes

To assess the safety of the APCI program in higher risk patients, major cardiovascular events (death, myocardial infarction (AMI) and stroke) and the rate of readmission up to 7 days after discharge were registered. Patients treated in the period between January 2009 and October 2015 represented the preintervention cohort, a period characterized by overnight hospitalization under continuous monitoring. This group was compared with patients undergoing the APCI program between November 2015 and March 2017.

To assess the feasibility of the APCI program in higher risk populations, the intervention cohort was divided into two groups: patients discharged on the same day of the procedure corresponded to the same-day discharge group (SDDG), while patients who remained hospitalized until the next day represented the hospitalization group (HG).

Four categories were added to describe the causes for overnight hospitalization in the intervention cohort: com-

plex PCI, patient's comorbidities, social causes and time of the procedure.

Definitions

In this study, elective PCI is every percutaneous coronary revascularization in patients with planned or ad hoc PCI. Ambulatory PCI is elective PCI in patients with same-day discharge following the procedure.

The criteria from the SCAI consensus on length of stay after PCI used to define higher risk patients for same-day discharge are basically grouped in clinical, comorbidity, anatomical, procedural an complication categories (5) (Figure 1).

Mortality refers to all-cause mortality. Acute myocardial infarction includes PCI-related and spontaneous myocardial infarction, as defined according to the Third Universal Definition of Myocardial Infarction. (11) Severe bleeding was assigned 3 to 5 levels according to the Bleeding Academic Research Consortium (BARC) definitions. (12) Stroke involves a transient ischemic attack or an ischemic or hemorrhagic stroke with focal or general neurological dysfunction caused by brain, spinal cord or retinal injury, defined as transient or persistent, respectively. Major vascular access complications involve complications requiring surgery or hospitalization for their resolution, or those resulting in major hemorrhage.

Costs include those related with the hospital supplies for the patients, hours of hospital stay and the hospital bed assigned.

When analyzing the causes for hospitalization in the HG, social causes refer to a reluctant patient or relatives in accepting same-day discharge, either for personal reasons, or due to the opinion of their clinical cardiologist.

Statistical analysis

Qualitative variables were expressed as percentages and evaluated with the chi-square test or Fischer's exact test, as appropriate, and qualitative variables were expressed as mean±SD or median and interquartile range, as appropriate, and analyzed with Student's t test for independent samples or the Mann-Whitney test, respectively.

For the safety analysis of the APCI program in higher risk patients for same-day discharge, we compared the preintervention cohort vs. the intervention cohort. The primary endpoint was defined as the composite of death/AMI/stroke at 7 days and the rate of rehospitalization at 7 days, using a Cox proportional hazard model adjusted for multiple variables known for increasing the risk profile of patients for same-day discharge, (5) as well as for variables which were significantly different between both groups. These variables included age, sex, access route, multivessel disease (MVD), hypertension (HTN), diabetes (DBT), smoking habits, history of PCI or coronary artery bypass grafting (CABG), history of stroke, chronic obstructive pulmonary disease (COPD), chronic kidney disease (CKD), dialysis, history of AMI, peripheral vascular disease (PVD), ejection fraction, aortic stenosis, double antiplatelet therapy, left main coronary artery (LMCA) PCI, anterior descending artery (ADA) PCI, venous bridge PCI, PCI to real bifurcations, PCI to chronic total occlusions (CTO), complete revascularization and PCI failure.

For the feasibility analysis, the intervention cohort was divided into two groups: those discharged on the same day constituted the same-day discharge group (SDDG), whereas those that remained hospitalized overnight represented the hospitalization group (HG). The length of hospital stay and total costs were evaluated.

Ethical considerations

The study was approved by the institutional Ethics Committee and Directory, as it complies with normal treatment standards at our institution.

RESULTS

A total of 3,663 elective PCIs were performed between January 2009 and March 2017 with 2,805 patients belonging to the preintervention cohort and 858 to the intervention cohort. Figure 1 describes the selection process, showing finally 2,422 (86.3%) higher risk patients for the analysis of the preintervention cohort and 661 (77.1%) patients for the intervention cohort.

Safety

Table 1 shows the baseline characteristics of both cohorts. Patients in the preintervention cohort were older and with greater prevalence of male gender, femoral access and multiple comorbidities. Conversely, the intervention cohort showed greater prevalence of DBT and MVD.

The rate of the combined endpoint of death/AMI/stroke at 7 days was similar for both groups [intervention cohort 3/66 (0.5%) vs. preintervention cohort 11/2,422 (0.5%)] and, in the multivariate analysis, the intervention cohort did not show greater risk for the outcome (HR 1.04, 95% CI 0.29-3.75; p=0.94).

Similarly, no significant differences were encountered in rehospitalization (intervention cohort: 6/661 (0.9%) vs. preintervention cohort: 40/2,422 (1.7%), HR 0.53, 95% CI 0.22-1.27; p=0.15). The causes for readmission in the preintervention cohort were secondary to chest pain requiring observation in all cases, while in the intervention cohort they were secondary to 1 stroke (quadrantanopia) in the first day after discharge and 2 cases of pseudoaneurysm in days 6 and 7 post-discharge, respectively.

Feasibility

Among the total patients entering the APCI program, 345/661 (52.2%) corresponded to SDDG. The causes for overnight hospitalization in the HG were: 30.4% secondary to comorbidities, 20.3% associated with the intervention characteristics, 25.9% related to the time the procedure ended and 23.4% due to social causes. These patients had greater prevalence of comorbidities (MVD, ventricular dysfunction, PCI in unprotected LMCA and incomplete revascularization), as well as greater use of femoral access (Table 2). The characteristics associated to overnight hospitalization were: femoral access (OR 2.32, 95% CI 1.48-3.62; p <0.0001), severe aortic stenosis (OR 3.68, 95% CI 1.55-8.73; p=0.003), severe ventricular dysfunction (OR 3.58, 95% CI 1.38-9.29; p=0.009), PCI to unprotected LMCA (OR 2.37, 95% CI 1.19-7.11; p=0,047) and incomplete revascularization (OR 1.46, 95% CI 1.07-2.01; p=0.016).

As shown in Figure 2, total costs of hospitalization were reduced by 23% in SDDG (p <0.0001), and

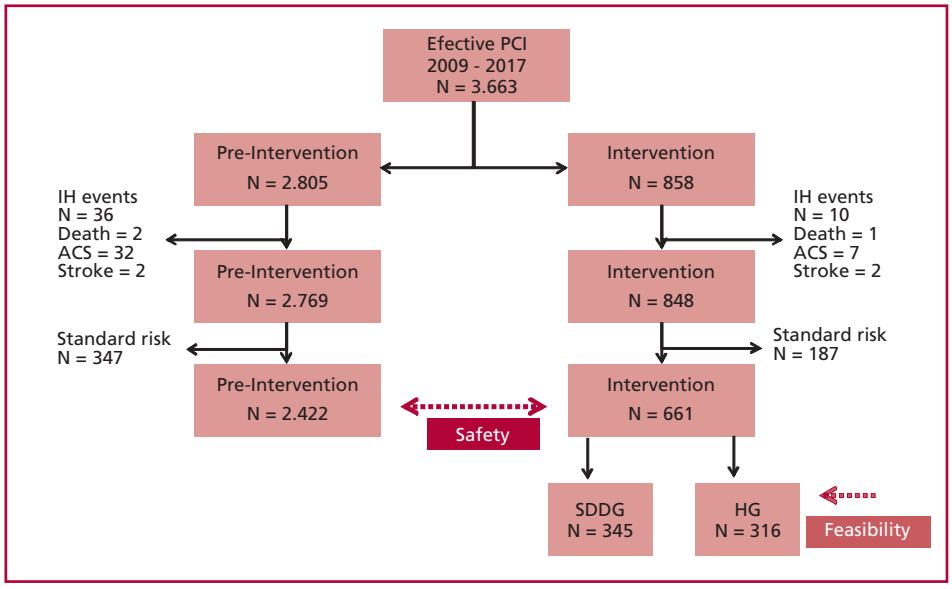

Fig. 1. Flow diagram of the study population
PCI: Precutaneous coronary intervention. IH: In-hospital. ACS: Acute coronary syndrome. SDDG: Same-day discharge group. HG: Hospitalization group.

	Pre-Intervention (N= 2,422)	Intervention (N= 661)	P
Men, n (%)	2,072 (85.5)	538 (81.4)	0.009
Age, years ± SD	70.7 ± 10	69 ± 10	0.001
Age >70, n (%)	1,411 (58.3)	370 (56)	0.292
Femoral access, n (%)	912 (37.7)	127 (19.2)	0.000
MVD, n (%)	1,350 (55.7)	410 (62)	0.004
Smoking, n (%)	1,453 (60)	276 (41.8)	0.000
HTN, n (%)	1,879 (77.6)	568 (85.9)	0.000
DBT, n (%)	575 (23.7)	182 (27.5)	0.045
Dyslipidemia, n (%)	1,964 (81.1)	596 (90.2)	0.000
Prior PCI, n (%)	958 (39.6)	246 (37.2)	0.275
Prior CABG, n (%)	377 (15.6)	110 (16.6)	0.501
Prior stroke, n (%)	81 (3.3)	11 (1.7)	0.000
COPD, n (%)	83 (3.4)	26 (3.9)	0.532
CKD, n (%)	211 (8.7)	31 (4.7)	0.003
Prior AMI, n (%)	465 (19.2)	105 (15.9)	0.052
Prior PVD, n (%)	198 (8.2)	46 (7)	0.305
Severe AoS, n (%)	61 (2.5)	36 (5.4)	0.000

MVD: Multivessel disease. HTN: Hypertension. DBT: Diabetes. PCI: Percutaneous coronary intervention. CABG: Coronary artery bypass grafting. COPD: Chronic obstructive pulmonary disease. CKD: Chronic kidney failure. AMI: Acute myocardial infarction. PVD: Peripheral vascular disease. AoS: Aortic stenosis.

Table 1. Safety: baseline characteristics of both cohorts

the length of hospital stay was reduced by 73% (HG 19.4, IQR 17.22-22.7 vs. SDDG 7.27 h IQR 5.8-9.1; p <0.0001). Figure 3 indicates that the length of hospital stay in this group increased according to higher risk factor (RF) burden for APCI: 1 RF: 6.8 h, IQR 5.6-8.1; 2 RF: 7.1 h, IQR 5.7-9.02; ≥3 RF: 7.7 h. IQR 6.4-11.5, ptrend 0.002.

DISCUSSION

In this work we observed that the implementation of an APCI program in higher risk patients was safe in terms of major cardiovascular events, and feasible, with reduction of length of hospital stay and costs.

The concept of the APCI program here presented represents the possibility of implementing a new, though by no means arbitrary, post PCI methodology. Furthermore, it is complex to establish an algorithm for decision-taking due to the heterogeneity of populations treated in each center and the variety of factors and their combinations. Moreover, it is necessary to adapt these methods of pre and post PCI approach for each institution, adding the institution's capacity of keeping contact with the ambulatory patient.

Ambulatory PCI, as part of the overall management of elective patients, is usually applied in highly selected populations. Centers which currently have

APCI programs exclude a great proportion of their population of PCI candidates for presenting variables that would increase same-day discharge risk as those suggested in SCAI guidelines and other reports with similar risk variables. In randomized studies, the exclusion reaches percentages ranging between 67% and 87.5% of patients analyzed. (13-16) Recently, in 2017, Córdoba-Soriano et al. published APCI results in 723 candidates for this procedure in Spain. Among them, 74% were discharged on the same day of the intervention. However, in this experience, the exclusion criteria applied were similar to those proposed by SCAI. Among 1,780 patients recruited in three high-volume centers during 2.5 years, 40% of the potential number of patients were included. According to this scale, 29.9% of elective patients received APCI during the study period. (4)

The main difference of our work is that the study population consists of patients which are generally excluded from other APCI series. In accordance with previous experiences, 77% of patients included presented at least one high risk characteristic for same-day discharge.

Stable coronary heart disease represents a very significant percentage of the hemodynamic lab activity. One of the main benefits demonstrated with the implementation of this type of programs is the increase in the availability of beds for admission, and the associated costs saved from their use without jeopardizing patient safety. (16, 17) In this context, the main challenge faced from the implementation of an APCI program is the correct identification of adequate candidates. Improved devices, the incorporation of adjuvant images, as well as the application of new pharmacological tools to reduce thrombotic and hemorrhagic events, have decreased the risk of complications in elective PCI, making it a procedure operated in a highly safe setting. (18-21)

To evaluate the safety of our APCI program, patients treated within the program framework (intervention cohort) were compared with preintervention cohort patients, who received standard care charac-

Table 2. Feasibility: baseline characteristics of the intervention cohort

	Hospitalization group (N=316)	Same-day discharge group (N=345)	P
Men, n (%)	246 (78.8)	292 (84.6)	0.025
Age >70, n (%)	187 (59.2)	183 (53)	0.113
Femoral access, n (%)	85 (26.9)	42 (12.2)	< 0.0001
MVD, n (%)	216 (68.4)	194 (56.2)	0.001
Smoking, n (%)	127 (40.2)	149 (43.2)	0.435
HTN, n (%)	277 (87.7)	291 (84.3)	0.221
DBT, n (%)	93 (29.4)	89 (25.8)	0.296
Dyslipidemia, n (%)	290 (91.8)	306 (88.7)	0.185
Prior PCI, n (%)	102 (32.3)	144 (41.7)	0.012
Prior CABG, n (%)	58 (18.4)	52 (15.1)	0.258
Prior stroke, n (%)	3 (0.9)	8 (2.3)	0.054
COPD, n (%)	13 (4.1)	13 (3.8)	0.819
CKF, n (%)	20 (6.3)	11 (3.2)	0.056
Prior AMI, n (%)	41 (13)	64 (18.6)	0.050
Prior PVD, n (%)	27 (8.5)	19 (5.5)	0.125
Severe AoS, n (%)	28 (8.9)	8 (2.3)	0.003
EF <30%	20 (6.6)	7 (2.2)	0.009
LMCA PCI (global), n (%)	30 (9.5)	17 (4.9)	0.023
- UP LMCA, n (%)	15 (4.7)	5 (1.4)	0.047
- P LMCA, n (%)	15 (4.7)	12 (3.5)	0.410
Proximal ADA PCI, n (%)	69 (21.8)	81 (23.5)	0.614
VB PCI, n (%)	14 (4.4)	10 (2.9)	0.293
PCI to bifurcation, n (%)	91 (28.8)	83 (24.1)	0.167
PCI to CTO, n (%)	47 (14.9)	38 (11)	0.139
Complete revascularization, n (%)	165 (53.7)	231 (69.8)	0.000
Succesful PCI, n (%)	292 (94.2)	329 (96.5)	0.164
Balloon angioplasty, n (%)	6 (1.9)	9 (2.6)	0.540

MVD: Multivessel disease. HTN: Hypertension. DBT: Diabetes. PCI: Percutaneous coronary intervention. CABG: Coronary artery bypass grafting. COPD: Chronic obstructive pulmonary disease. CKD: Chronic kidney failure. AMI: Acute myocardial infarction. PVD: Peripheral vascular disease. AoS: Aortic stenosis. EF: Ejection fraction. LMCA: Left main coronary artery. UP: Unprotected. P: Protected. ADA: Anterior descending artery. VB: Venous bridge. CTO: Chronic total occlusion

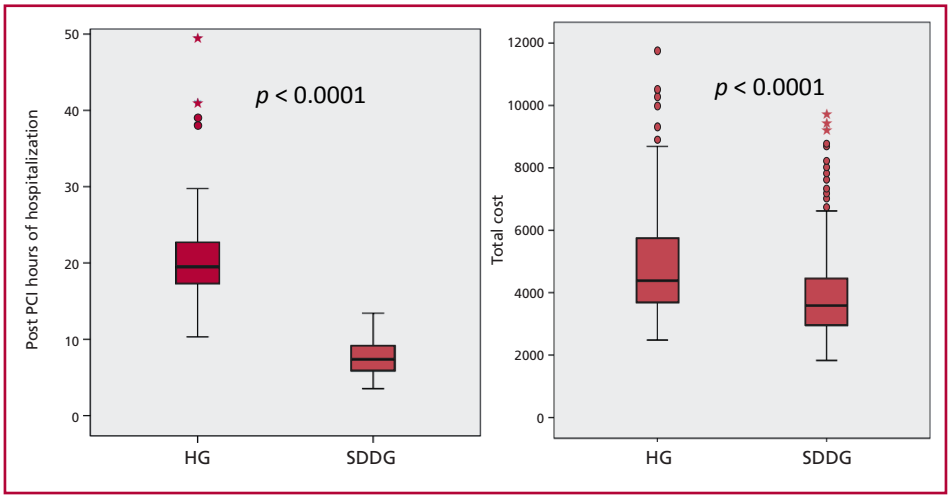

Fig. 2. Post PCI length of stay (hours) and costs of hospitalization
HG: Hospitalization group. SDDG: Same-day discharge group.

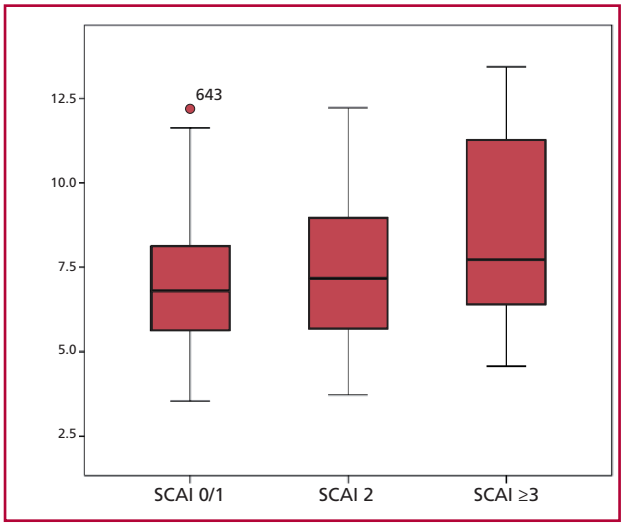

Fig. 3. Length of hospital stay in the same-day discharge group according to the number of risk factors
SCAI: Society for Cardiovascular Angiography and Interventions. PCI: Percutaneous coronary intervention.

terized by overnight hospitalization for continuous monitoring. We observed similar death/AMI/stroke rates at 7 days in both groups.

The implementation of the APCI program did not mean greater risk of adverse events or rehospitalization. It should be pointed out that the causes for readmission emerging from the analysis imply occasional institutional treatment; however, if the condition does not need emergency care, the patient can be treated within hours of its onset. Moreover, despite implementing wider inclusion criteria in our program, the rate of events was similar to other reports. (22)

To analyze the APCI program the intervention cohort was divided into two groups: SDDG and HG. At the onset of the APCI program, serial evaluations were carried out by a multidisciplinary team of clinical and interventional cardiologists and nurses dedicated to decide whether the patient was in condition for same-day discharge or whether it was convenient to monitor him overnight. In this sense, Graziano et al. identified certain barriers for APCI. (23) In our series we observed that certain patient (aortic stenosis, ventricular dysfunction) and procedural (femoral access, PCI to unprotected LMCA or incomplete revascularization) characteristics were associated with greater possibility of being selected for the HG in the multivariate analysis.

Radial access is the access route of choice for PCI due to the reduced hemorrhagic risk compared with the femoral access. However, the latter represents a not inconsiderable percentage in elective practice, representing in our case 12.2% of SDDG patients. On the other hand, we have reported the use of APCI in complex PCI, within an adequate safety framework for the patient. In the SDDG, 1.4% of patients received PCI to an unprotected LMCA, 2.9% to an aorto-coronary bridge, 24.1% to a real bifurcation and 11% to a chronic total occlusion. In the same line, Koutouzis et al. reported that from the total number of complex PCIs performed between 2013 and 2015, 16.9% were APCI and that the incidence of adverse events at 30 days was similar between this group and patients with overnight hospitalization. (24)

As expected, in our experience SDDG patients presented a significant reduction in costs (23%) and length of stay (73%), similarly to other reported experiences. (14-17) Regarding this last point, we have seen that in our methodology, the RF burden for APCI seemed to condition the length of stay in SDDG but not in HG.

Finally, with the advent of this practice in the medical setting, social uncertainty (physician, patients and relatives) appears as an undescribed limitation in previous works. However, we should not diminish its importance as it represents a significant proportion for the implementation of a program with these characteristics. A recent study acknowledges the lack of SCAI guidelines knowledge by cardiologists, revealed by the great disparity and poor agree-

ment on the length of stay post PCI. (25) Current expert consensuses report on length of hospital stay post PCI based on studies performed in different countries with different cultures and systems of medical practice. The population description, as well as pre, intra and post procedural barriers of the real world may be useful as a first step to standardize practice as well as to develop strategies promoting the efficacy of the process to provide better patient care quality. It is necessary to educate and familiarize patients and professionals about the safety and success of this modality when it is implemented on the appropriate population, to broaden their knowledge and acceptance of this strategy.

Limitations

Our study presents important limitations. Firstly, it is a retrospective study performed in a single center specifically dedicated to the treatment of cardiovascular disease, and consequently the results need to be confirmed with prospective, multicenter studies.

The process of discharge after PCI is dynamic and complex, subject to numerous variables, some of which have not been adequately measured in our work, given its observational and retrospective nature.

On the other hand, we admit that in most patients undergoing an elective procedure, PCI is ad hoc, which in some cases reduces early discharge secondary to the treated anatomy and affects the modality in the subsequent patients in relation to the limited time of observation.

CONCLUSIONS

The implementation of our APCI program in a higher risk population was associated with similar rates of major events and rehospitalization than in patients treated with standard care. The reduction in the time and costs of hospital stay could have a positive effect on the institutional operative efficiency.

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material)

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