ORIGINAL ARTICLE

Primary Outcomes and Morbi-mortality Associated Factors in the Coronary Angioplasty Argentine Registry - RAdAC

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ABSTRACT

Background
Percutaneous transluminal coronary angioplasty (PTCA) outcomes were compiled in the 1996 V CONAREC Registry, and in 2005, data collection was repeated using a similar methodology, giving rise to the XIV CONAREC Registry. As no general national PTCA results have been reported since, the Argentine Society of Cardiology, together with CACI, FAC and CONAREC carried out the Coronary Angioplasty Argentine Registry (RAdAC).

Objective
The aim of this Registry was to evaluate intrahospital outcome and morbi-mortality of patients submitted to PTCA according to different clinical scenarios.

Methods
One thousand nine hundred and five patients were prospectively and consecutively included in 67 centers of Argentina during a 7-month period. Cardiovascular risk factors and clinical history were analyzed. PTCA procedures were classified as: planned, urgent or emergent and the number of affected and intended-to-treat vessels, as well as the number and type of stents implanted [bare metal (BMS) or drug-eluting stents (DES)] were estimated. Use of atherectomy, Cutting Balloon®, thrombus aspiration, intravascular ultrasound (IVUS), antiplatelet drugs and intra-aortic balloon pump (IABP) was analyzed. Angiographic success was defined as residual lesion <20% and normal flow (TIMI 3).

Results
Mean age was 63.8 years. A total of 752 patients (39.5%) presented with acute myocardial infarction (AMI) and 834 patients (43.8%) with unstable angina (UA). Femoral access was used in 92.8% of the cases. Overall, 44.3% of the interventions were planned, 37.8% were urgent and 17.9% emergent. A total of 2753 stents were implanted (1.4 per patient), 33.2% of which were DES. The primary success rate was 97% and overall mortality 1.6%: 3.2% associated to AMI, (4.3% STEMI and 1.7% non-STEMI), 0.8% to UA and 0.3% to chronic stable angina. Death-associated variables were: cardiogenic shock, need of IAPB, Killip-Kimball class 3-4, emergency PTCA, left main PTCA, ventricular function impairment, renal failure or diabetes, number of affected vessels, age and PTCA failure.

Conclusions
In our setting, most PTCAs are performed in acute coronary syndromes, almost exclusively by femoral access, with primary success comparable to that of international reports, but employing less DES. Use of Rotablator®, Cutting Balloon®, thrombus aspiration, IVUS and IABP implementation was lower than expected, while age, cardiogenic shock, emergency and PTCA failure were factors associated with increased morbi-mortality.

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Key words > Myocardial Infarction - Unstable angina- Angioplasty - Stents - Risk Factors - Mortality

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Abbreviations >

BACS:	Acute coronary syndrome	**FAC:**	Hemodynamics Council of the Argentine Federation of Cardiology
AMI:	Acute myocardial infarction	**IABP:**	Intra-aortic balloon pump
BMS:	Bare metal stent	**IVUS:**	Intravascular ultrasound
CACI:	Argentine College of Interventional Cardioangiologists	**KK:**	Killip and Kimball functional class
CONAREC:	National Council of Cardiology Residents	**PTCA:**	Percutaneous transluminal coronary angioplasty
COPD:	Chronic obstructive pulmonary disease	**RAdAC:**	Coronary Angioplasty Argentine Registry
CSA:	Chronic stable angina	**RF:**	Renal failure
DES:	Drug-eluting stent	**SAC:**	Argentine Society of Cardiology
HF:	Heart failure	**SMR:**	Surgical myocardial revascularization
		UA:	Unstable angina

BACKGROUND

Percutaneous transluminal coronary angioplasty was introduced by Grüentzig in 1978. (1) Procedural experience and technological advances have allowed remarkable outcome improvement, enabling the treatment of more complex lesions with higher anatomical risk. (2, 3) Randomized and controlled studies have demonstrated that drug-eluting stents (DES) compared to bare metal stents (BMS) significantly reduce restenosis, (4, 5) further expanding their use.

In 1966, the National Council of Cardiology Residents completed the V CONAREC Registry, (6) where they compiled during 6 months coronary angioplasty results from 1295 consecutive patients in centers with cardiology residency, and concluded that success and morbi-mortality were comparable to those observed in the literature. Later, during 2005, data from 1500 patients was collected using a similar methodology, generating the XIV CONAREC Registry. (7)

Thereafter, there has been no overall national data on percutaneous transluminal coronary angioplasty. Therefore, the Hemodynamics and Interventional Cardiology Council "Dr. Isaac Berconsky" of the Argentine Society of Cardiology (SAC), together with the Argentine College of Interventional Cardioangiologists (CACI), the Hemodynamics Council of the Argentine Federation of Cardiology (FAC) and the National Council of Cardiology Residents (CONAREC) have implemented the Coronary Angioplasty Argentine Registry (RAdAC).

The purpose of this Registry was to collect information on percutaneous revascularization in our country, highlighting the population characteristics, intrahospital outcomes, revascularization modality (main vessel, bifurcation, multivessel, etc.), types of stents and morbi-mortality associated factors.

METHODS

One hundred and forty six Interventional Cardiology Centers certified by CACI were invited via e-mail and/or by telephone to participate in May 2010 and 67 centers (45%) accepted the invitation (see Appendix).

A database to be completed in the Internet was prepared. Inclusion of each patient was performed by each researcher of the participating centers and the submitted information was confidential.

Patients ≥ 21 years of age, with acute or chronic coronary disease, undergoing coronary angioplasty, and having provided written informed consent to participate in the registry, were prospectively and consecutively included. The informed consent was previously reviewed and approved by SAC´s Ethics Committee. The following risk factors were considered: hypertension, diabetes, smoking, ex-smoker, family history of coronary disease, hypercholesterolemia and obesity-overweight.

Clinical history assessment included: previous surgical myocardial revascularization (SMR) or PTCA, heart failure (HF) and its functional class, renal failure (RF), peripheral vascular disease, acute myocardial infarction (AMI), stroke and chronic obstructive pulmonary disease (COPD). For a better analysis, PTCA procedures were classified as: a) programmed, performed electively, b) urgent, performed within 24 h of the acute coronary syndrome (ACS) clinical diagnosis and c) emergent, performed as soon as possible in case of AMI or high risk unstable angina (UA).

Clinical presentation was typically considered as: chronic stable angina (CSA), UA or ST elevation, ST depression or undefined AMI, as applicable, establishing the functional class (Killip and Kimball -KK-) in each case and cardiogenic shock when present.

Functional tests were declared as either performed or not. Troponin and CK-MB were categorized as positive, negative or not performed. Plasma creatinine was expressed in mg/dl. Left ventricular function was classified as not assessed, normal, mild, moderate or severe.

The angiographic report contained: a) dominance, b) proximal, medial and distal segments with ≥ 70% obstruction corresponding to main vessels (right, anterior descending and circumflex coronary arteries), c) ≥ 70% obstructions in ≥ 2 mm right coronary or circumflex (posterior descending and postero-ventricular), anterior descending (first diagonal and second diagonal) or circumflex (first and second latero-ventricular) secondary branches, d) ≥ 70% obstructions in venous and/or mammary bridges and e) ≥ 50% obstructions in the left main coronary artery, also considering the involved segment/s (proximal, medial and distal). Intra-stent restenosis was also established when it involved ≥ 70% of the vessel lumen. All the aforementioned segments were classified as either treated or not treated.

The number of affected vessels per patient was quantified as well as the number of affected vessels in the overall population. One, two or three vessel coronary disease was determined according to the presence of ≥ 70% obstruction in the right coronary, the anterior descending and/or circumflex arteries, and more than three vessel disease when in addition there was obstruction in at least one ≥ 2 mm diagonal (corresponding to the anterior descending), lateral (corresponding to the circumflex artery), posterior descending or postero-ventricular (corresponding to the right coronary or circumflex artery) branch. A similar approach was used to

establish intention to treat. In this stage, the SYNTAX score was calculated. (8) The rate of affected vessels per patient corresponded to the quotient between the total number of affected vessels and the total number of patients, while the rate of angioplasty or stenting per patient corresponded to the quotients between the total number of angioplasties or stents and the total number of patients.

The number of affected vessels and treated vessels per patient was analysed during hospitalization. Patients receiving treatment for single vessel disease despite presenting multiple lesions were added to the group of patients with single vessel disease to calculate percentages.

The number and type of stent used per patient according to whether they were bare metal or drug-eluting stents was assessed, as well as the total number of stents in the overall population. Due to the different characteristics of DES concerning their metal structure, polymer, drug, bioavailability, etc, their individual trademarks were recorded.

Regarding the use of clopidogrel and prasugrel, usually employed in these procedures, the loading and maintenance doses were recorded for each drug.

The following technical aspects of the procedure were considered: a) access route (radial, humeral or femoral), b) use of IIb/IIIa inhibitors, c) need for intra-aortic balloon pump, d) use of IVUS, e) plaque preparation with Cutting Balloon® or Rotablator®, and f) thrombus aspiration.

Angiographic success consisted in < 20% residual lesion with normal flow (TIMI 3).

Statistical analysis

Categorical variables were expressed as absolute values, percentages and ratios, while quantitative variables were expressed as mean and standard deviation, and eventually, with their maximum, minimum and range. The normality of metric variables was assessed with the K-S goodness of fit test. Statistical comparison between qualitative variables was performed using the chi square test with or without Yates correction or Fischer´s exact test, as applicable. In turn, quantitative variables were compared using Student´s t test under normality and equal variance assumptions. In these cases, a two-tailed p value < 0.05 was considered statistically significant. All the variables that in the univariate analysis had a statistical significance ≤ 0.05 were incorporated in the multivariate logistic regression analysis. A forward stepwise method was used and the model was adjusted based on the -2 log likelihood. The first regression involved 1905 patients, excluding KK class variables and ventricular function, as the registry lacked some results of these variables. A second regression with 366 patients also included these two variables.

SPSS for Windows version 11.5® (SPSS Inc., Chicago, Ill, USA) was used for statistical calculations.

RESULTS

Reported results correspond to 1905 patients undergoing percutaneous coronary intervention between May 1, 2010 and November 30, 2010.

Mean age was 63.8 years (SD, 11.07; range, 64, minimum: 28, maximum: 92, normal distribution). Distribution by gender and clinical history are summarized in Table 1. Type of angina at admission, functional test results for ischemia and urgency to perform the intervention are shown in Table 2.

Eighty-four point 9 percent of the procedures were performed in the context of UA or AMI.

Although being the purpose of another study, infarct results were also separately analyzed.

AMI overall mortality was 3.1%, 4.3% STEMI and 1.7% non-STEMI.

Univariate analysis of variables associated to mortality in AMI PTCA were: cardiogenic shock at the time of admission (OR: 44.5), need for intra-aortic balloon pump (IABP) (OR: 25.9), KK class 3-4 (OR: 18.7), main coronary artery PTCA (OR: 11.4), RF(OR: 3.84), ST elevation AMI (OR: 2.87), moderate to severe left ventricular function impairment (OR: 2.78), diabetes mellitus (OR: 2.64), greater number of affected vessels per patient, and successful or unsuccessful condition (OR: 35.7).

In the multivariate analysis, the associated variables were use of IABP (OR: 9.57), thrombus aspiration (OR: 5.17) and shock (OR: 41.6).

Table 3 summarizes KK class, left ventricular function and biochemical markers at the time of admission of patients in whom values were informed.

Table 4 presents the descriptive analysis of performed procedures, the number of treated vessels, utilization and type of stent, vascular accesses and associated procedures and use of antiplatelet drugs.

Moreover, the percentages of clopidogrel/prasugrel administration correspond to the indicated loading dose prior to angioplasty, while the percentage that

Table 1. Population characteristics (n = 1905)

	n	%
Men	1454	76.3
Prior angiography	449	23.6
Prior coronary surgery	120	6.3
Prior infarction	396	20.8
Heart failure	120	6.3
- FC 1*	19	15.8
- FC 2*	61	50.8
- FC 3*	24	20.0
- FC 4*	16	13.3
Prior stroke	43	2.3
Hypertension	1436	75.4
Renal failure	110	5.8
Peripheral vascular disease	76	4.0
COPD	62	3.3
Smoking	513	26.9
Ex-smoker	535	28.1
Dyslipidemia	1288	67.6
Diabetes (total)	384	20.2
- type 1*	43	11.2
- type 2*	341	88.8
Overweight/obesity	597	31.3
Family history	274	14.4

* The FC percentages of heart failure and type of diabetes are calculated with respect to their own group.
FC: Functional class. COPD: Chronic obstructive pulmonary disease.

Table 2. Population characteristics (n = 1905)

	n	%
AMI	752	39.5
- undefined*	299	39.8
- ST depression*	63	8.4
- ST elevation*	390	51.9
- With cardiogenic shock	32	1.7
Unstable angina	834	43.8
Chronic stable angina	287	15.1
- FC 1*	36	12.5
- FC 2*	140	48.8
- FC 3*	80	27.9
- FC 4*	31	10.8
Cases with functional test	521	27.3
- Ischemia in functional test*	456	87.5
Moment of intervention		
- programmed	844	44.3
- urgent	720	37.8
- emergent	341	17.9

* Type of infarction, FC in chronic angina and ischemia in functional test percentages are calculated with respect to their own group.
AMI: Acute myocardial infarction. FC: Functional class.

Table 3. Killip and Kimball class, left ventricular function and biochemical markers at admission

	n	%
Killip and Kimball infarct class		
- 1	279/381	73.2
- 2	75/381	19.7
- 3	7/381	1.8
- 4	20/381	5.3
Left ventricular function		
- normal	973/1458	66.7
- mild	224/1458	15.4
- moderate	179/1458	12.3
- severe	82/1458	5.6
Troponin +	452/596	75.8
CK-MB +	497/671	74.1

did not receive loading dose corresponded to patients already under antiplatelet therapy.

The relation between the number of affected and treated vessels during hospitalization is shown in Figure 1. The associated percentages indicate that in 57.7% of patients with two vessel disease both vessels were treated, and similarly for the rest of the percentages. Forty five percent of treated vessels corresponded to the anterior descending coronary artery, 27% to the right coronary artery, 21% to the circumflex artery and the remaining 7% to the main coronary artery or diagonal branches.

Table 5 shows overall intrahospital mortality and major complications. Although overall mortality was 1.6%, that associated with infarction increased to 3.2%, whereas in UA it was 0.8% and in CSA, 0.3%. Univariate analysis of angioplasty intrahospital mortality associated factors is shown in Table 6.

Death-related variables by order of relevance according to their ORs were: cardiogenic shock at the time of admission, need of IABP, FF class 3-4, emergent treatment, HF, main coronary angioplasty, need for thrombus aspiration, moderate to severe left ventricular function impairment, RF or diabetes, greater number of affected vessels per patient, older age and successful or unsuccessful condition.

Table 7 shows step by step the multivariate analysis of factors associated with angioplasty intrahospital mortality. This logistic regression analysis included all the variables that had a statistical significance ≤ 0.05 in the univariate analysis, and simultaneously excluded the following combinations of possible confounding variables: KK 4 with shock, KK 4 with aortic counterpulsation and KK 4 with HF. The best model that reduced the -2 log likelihood and increased the coefficients of determination was that which included shock, KK class and emergency.

DISCUSSION

This Coronary Angioplasty Argentine Registry (RAdAC) was prospectively carried out across 7 months in 2010, including a greater number of hemodynamic centers than any former registry performed in our country. Furthermore, by assembling the main scientific organizations on this field nationwide, a broader and more representative sample of the local reality was achieved.

Unlike the V CONAREC (6) and XIV CONAREC, (7) Registries, the RAdAC included centers with and without cardiology residency. The major prevalence risk factors were hypertension and dyslipidemia, and three out of four patients were men, similarly to the two previously mentioned registries.

The number of angioplasties in patients with acute ischemic syndrome was higher in the RAdAC than in the XIV CONAREC Registry, (7) whereas the number of patients with two or three vessel disease (55. 5%) and proportion of ST elevation AMI was similar to the RAdAC Registry.

Concerning other countries, the RAdAC overall results are comparable to the ACC-NCDR (The American College of Cardiology - National Cardiovascular Data Registry), NHLBI Dynamic Registry (The National Heart, Lung, and Blood Institute Registries), (9) RENAC (Chilean National Coronary Angioplasty Registry) (10) and the Spanish Registry of Hemodynamic and Interventional Cardiology (11).

From all the RAdAC patients, only 22% were treated with two or three vessel angioplasty. Focusing on this data, we notice that 57.7% of patients with two vessel disease had treatment in both vessels, whereas only 15.1% of patients with three vessel disease had

Table 4. Descriptive analysis of procedures

	n	%
Total number of patients	1905	100.0%
Main left coronary artery	52	2.7%
Mammary artery	15	0.8%
Venous bridge	88	4.6%
Intrastent restenosis	186	9.8%
Total number of affected vessels	3449	
Affected vessels per patient	1.8	
Number of angioplasties	2397	
Angioplasties per patient	1.3	
Angioplasties without stent	76	3.2%
Number of stents		
- 1	1118	40.6%
- 2	525	38.1%
- 3	155	16.9%
- 4	25	3.6%
- > 5	4	0.7%
Total	2753	100.0%
Stents per patient	1.4	
Type of stent		
- Bare metal	1839	66.8%
- Drug-eluting	914	33.2%
Total	2753	100.0%
Type of access		
- femoral	1767	92.8%
- radial	136	7.1%
- humeral	2	0.1%
Balloon counterpulsation	17	0.9%
Trombus aspiration	39	2.0%
Cutting Balloon®	18	0.9%
Rotablator®	3	0.2%
IVUS (ultrasonography)	14	0.7%
Primary success	1847	97.0%
Clopidogrel (loading dose)		
- 300 mg	694	36.4%
- 600 mg	661	34.7%
Prasugrel (loading dose)		
- 30 mg	22	1.2%
- 60 mg	83	4.4%
IIb/IIIa inhibitors	163	8.6%

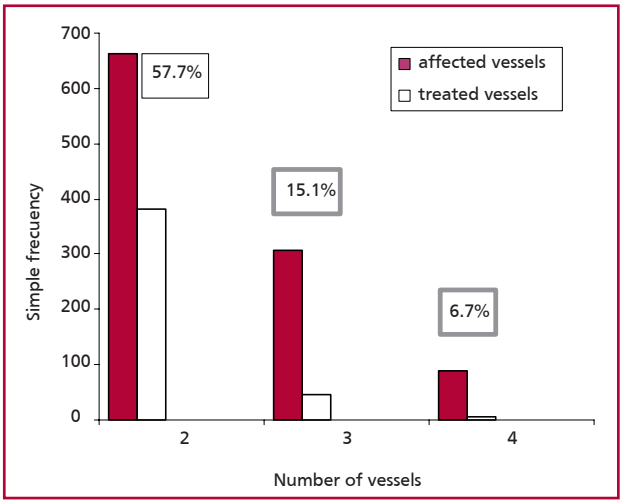

Fig. 1. Relationship between the number of affected and treated vessels during hospitalization. The associated percentages indicate that both vessels were treated in 57.7% patients with two-vessel lesions, and similarly for the rest of the percentages.

Table 5. Mortality and major in-hospital complications

	n	%
Death	31	1.6
Infarction	50	2.6
New angioplasty	11	0.6
Urgent surgery	2	0.1
Bleeding	5	0.3
Major stroke	0	0.0

complete revascularization. We attribute these results to the fact that multivessel disease PTCA revascularization is often incomplete due to untreatable lesions (total occlusions, small vessels or absence of distal vascular beds) or simply to clinical criteria. The RAdAC results agree with the evidence of the Euro Heart Survey-PCI Registry on multivessel PTCA in 4400 patients with ACS without hemodynamic involvement. (12) This work demonstrated that there were no differences in intrahospital mortality between multivessel and culprit vessel PTCA, but there was a greater rate of non-lethal periprocedural AMI (8.8% vs. 1.8%) in multiple interventions. In an interesting work by Bauer et al. on this same registry (13) the results of culprit vessel versus multivessel PTCA in patients with cardiogenic shock, demonstrated no benefits in favor of the multivessel intervention. They concluded that multivessel PTCA is only employed in 25% of patients with shock and that additional PTCA to the non-culprit vessel was not associated with survival. In the RAdAC we observed an overall use of stents (94.7%) similar to the XIV CONAREC Registry, with an increase in the use of DES: 33.2% vs. 18.67%, respectively. Although the increase in the utilization of DES is evident, the proportion is clearly lower than in the United States and in Europe, where at present it is over 85-90%. The RAdAC DES rate is similar to the average (32%) observed in the 2006 European Registry. (14) In our Registry, the DES rate (33.2%) was barely over that of diabetic (20.2%) plus intrastent restenosis (9.8%) patients, which is not surprising, taking into account that they are the main indications accepted by healthcare systems, generally based on the Compulsory Medical Program of the National Ministry of Health. (15)

The low employment of thrombus aspiration, Cut-

Table 6. Univariate analysis of angioplasty hospital mortality associated factors

Age (mean ± SD)	Dead (n = 31) 67.5 ± 14.2		Alive (n = 1874) 63.8 ± 11.0		p 0.065†	Odds ratio -
CHF	10	32.3	113	6.0	< 0.0001	7.4
CRF	5	16.1	105	5.6	0.035*	3.2
Diabetes	11	35.5	373	19.9	0.032	2.21
Cardiogenic shock	14	45.2	18	1.0	< 0.0001	84.9
Intervention:						
emergency	21	67.7	320	17.1	< 0.0001	10.2
	n (N)	%	n (N)	%		
KK class						
3 or 4	8 (21)	38.1	22 (506)	5.7	< 0.0001	13.5
LV function:						
Moderate/severe	11 (21)	52.4	250 (1437)	17.4	< 0.0001	5.22
	n = 31	%	n = 1874	%		
Main coronary vessel	4	12.9	48	2.6	0.003*	5.64
Affected vessels per patient	2.2 (± 0.88)	-	1.8 (± 0.87)	-	0.011†	-
Counterpulsation balloon	3	9.7	14	0.7	0.002**	14.2
Thrombus aspiration	3	9.7	36	1.9	0.024**	5.47
Unsuccessful angioplasty	26	83.9	1821	97.2	0.0001*	7.14

† Student t test.
* Yates chi square
** Fisher´s p.
Chi-square, the rest.

Table 7. Multivariate analysis of angioplasty intrahospital mortality associated factors. Summary of three successive model coefficients.

		B	SE	Wald	Significance	Exp(B)	95.0% CI for Exp(B)	
							Inferior	Superior
Model 1	Shock	3.535	1.050	11.331	0.001	34.300	4.379	268.673
	Constant	-3.535	0.321	121.432	0.000	0.029		
Model 2	Shock	3.729	1.062	12.326	0.000	41.625	5.192	333.729
	KK	2.119	0.853	6.169	0.013	8.325	1.564	44.326
	Constant	-3.729	0.358	108.616	0.000	0.024		
Model 3	Shock	3.506	1.114	9.902	0.002	33.321	3.752	295.922
	KK	1.785	0.872	4.195	0.041	5.959	1.080	32.887
	Emergency	1.606	0.805	3.983	0.046	4.981	1.029	24.107
	Constant	-4.741	0.731	42.045	0.000	0.009		

ting Balloon®, rotational atherectomy and IVUS systems is remarkable. There may be several reasons for this conduct; however, it is mainly presumed that it is due to the increased complexity and procedure duration and that the cost of the devices is not always supported by the healthcare systems of our country thus, limiting their use.

The overall use of IABP was 0.9%, compared with 1.7% PTCA in cardiogenic shock. Undoubtedly, IABP does not escape from the previous considerations concerning the use of thrombus aspiration and plaque preparation. However, the recent NCDR registry (United States) on 18990 PTCAs with IABP, (16) shows in the multivariate analysis that the near 5% intrahospital mortality did not vary among IABP quartiles per hospital (comprising from 0% to 40% IABP utilization), and that there was no evidence of a better outcome in patients treated in hospitals with greater

IABP utilization compared to those in which it was less used. This would support the non-systematic use of this mechanical circulatory assist device. In accordance with this result the Euro Heart Survey on PCI Registry, (17) which involved 33 countries, reported 25% IABP treatments during PTCA in cardiogenic shock after AMI without associating balloon pump use with improved survival. The radial technique increased slightly in comparison with previous registries, but it is still occasionally used, except in some centers in which it is more systematically employed.

The primary success rate was high, 97%, and use of antiplatelet drugs, such as loading doses of clopidogrel or prasugrel was less than expected. This may correspond to a population with stable angina, submitted to angioplasty after antiplatelet treatment.

Use of IIb/IIIa inhibitors was scarce compared to the amount of acute ischemic syndromes. As already mentioned, this may also correspond to a cost issue.

Functional studies to determine ischemia were done in a low percentage of patients, mainly in those with stable angina or undefined infarction.

The mortality observed in AMI (3.2%) is lower than that reported in the XIV CONAREC Registry (8%) and the one observed in the 2005 AMI SAC Survey (9.6%). These differences may probably be explained by a previous selection of patients undergoing primary PTCA. In this sense, the Swedish Coronary Angiography and Angioplasty Registry (SCAAR), (18) on 3284 patients, revealed a mortality of 3.5% at 7 days when the AMI culprit vessel was closed (two- thirds of the patients) and of 1.2% when the vessel was patent. This result was coincident with the previous use of lipid-regulating drugs, pretreatment with heparin and IIb/IIIa inhibitors and less than 80 years of age. This angiographic characterization was not considered in the RAdAC.

Age, cardiogenic shock, emergent angioplasty and unsuccessful procedure were significantly associated with higher mortality. These data are similar to those observed by Chuntao Wu et al., (19) who determined 9 predictive variables of intrahospital mortality with a logistic regression model applied on 46090 angioplasties performed in 2002 in 41 hospitals of the State of New York, indicating that the two risk factors associated with a very high death risk were shock (OR 19.92, 95% CI 11.92% to 33.30%) and AMI within 24 hours pre-PTCA with stent thrombosis (OR 18.75, 95% CI 7.27% to 48.37%). In addition to these variables, RAdAC considered left main coronary artery PTCA (infrequent practice in 2002) and unsuccessful PTCA.

The Percutaneous Coronary Intervention in Europe in 2006 Registry (14) published in May 2010, was carried out on 1,001,000 PTCAs in 23 countries, out of which 70% were performed ad hoc. Multivessel disease was treated in one session in 15% of the cases, 18% were AMI and 0.85% were stent/angioplasty. DES average rate was 32% with great disparity among countries (Italy 88%, Bulgaria 1%). IABP fluctuated between 0% and 8.7%, with an average value close to 1%. Something similar occurred with the use of IVUS (average of 1.2%) where surprisingly, in 15 countries, including the United Kingdom, it was ≤ 1%. Overall mortality reached 0.4%. On the whole, these numbers agree with those observed in the RAdAC, except for the percentage of treated AMI which doubles in our country.

When we examine registry data from other developing countries, Malasia published a 3-year national registry, (20) with 11498 angioplasties performed on 10602 patients, with a surprisingly low age average of 57 years, and a high incidence of diabetic (50%) and RF (47%) patients. However, the primary success was identical to that of our registry (97%) and the overall mortality was 1%. Unfortunately, the rate of emergency procedures is not mentioned, but it establishes that this condition, the higher KK class and old age were the worst prognostic factors.

Limitations

Despite the established protocol, as in any registry, data are approximated. The sources of potential error include loss of raw data external validation provided by the different institutions and the fact that they are not yet representative of all the angioplasties performed in our country. However, the most accurate recording of data was ensured, linking all scientific societies and for this first RAdAC cut-off a significant number of cases was collected.

Unlike the previous registries, the main contribution of RAdAC was to provide updated information on angioplasty in our setting, by including a larger number of centers with or without cardiology residency.

CONCLUSIONS

Compared with previous registries, there is an increase of PTCA in ACS with an elevated rate of primary success and low mortality, mainly in programmed procedures.

The femoral access is the one most frequently used and device employment for plaque preparation, thrombus aspiration, IVUS and IABP is lower than expected. The rate of drug-eluting stents is increasing, although its use is much lower than in developed countries.

Univariate and multivariate analysis confirm age, cardiogenic shock, failed PTCA and emergency as the factors associated with morbi-mortality.

Conflicts of interest

None declared

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RESUMEN

Resultados hospitalarios y factores asociados con morbimortalidad del Registro Argentino de Angioplastia Coronaria (RAdAC)

Introducción

En el Registro CONAREC V, de 1996, se recopilaron los resultados obtenidos con angioplastia transluminal coronaria (ATC) y posteriormente, durante 2005, se recabaron datos con similar metodología generándose el Registro CONAREC XIV. Desde entonces no se cuenta con datos nacionales generales en relación con la revascularización coronaria percutánea, por lo que la Sociedad Argentina de Cardiología, en conjunto con el CACI, la FAC y el CONAREC, implementó el Registro Argentino de Angioplastia Coronaria (RAdAC).

Objetivo

Evaluar a escala nacional los resultados intrahospitalarios y la morbimortalidad de pacientes sometidos a ATC según los distintos escenarios clínicos.

Material y métodos

En un período de 7 meses se incluyeron 1.905 pacientes en forma prospectiva y consecutiva en 67 centros de la Argentina. Se analizaron factores de riesgo, antecedentes cardiovasculares y cuadro clínico. La ATC se consideró programada, de urgencia y de emergencia, y se estimó el número de vasos enfermos y la intención de vasos a tratar y la cantidad y tipo de stents [convencionales (SC) y liberadores de droga (SLD)]. Se analizó el empleo de aterectomía, Cutting Balloon®, tromboaspiración, ultrasonido intravascular (IVUS), antiagregantes y balón de contrapulsación intraaórtico (BCIA). El éxito angiográfico se definió como lesión residual < 20% y flujo normal (TIMI 3).

Resultados

La edad promedio fue de 63,8 años. Un total de 752 pacientes (39,5%) presentaban infarto agudo de miocardio (IAM) y 834 pacientes (43,8%) angina inestable (AI). Se utilizó acceso femoral en el 92,8% de los casos. El 44,3% de las intervenciones fueron programadas, el 37,8%, de urgencia y el 17,9%, de emergencia. Se implantaron 2.753 stents (1,4 por paciente) con 33,2% de SLD. El éxito primario fue del 97% y la mortalidad global observada, del 1,6%; la asociada con infarto ascendió al 3,2% (con ST 4,3%, sin ST 1,7%), la de AI fue del 0,8% y la de angina crónica estable, del 0,3%. Las variables asociadas con el óbito fueron shock cardiogénico, necesidad de BCIA, Killip y Kimball 3-4, ATC de emergencia, ATC del tronco, mala función ventricular, insuficiencia renal o diabetes, mayor número de vasos enfermos, mayor edad y fracaso de la ATC.

Conclusiones

En nuestro medio, la mayoría de las ATC se realizan en síndromes coronarios agudos y casi exclusivamente por vía femoral, con éxito primario comparable a datos internacionales pero con menor utilización de SLD. El empleo de Rotablator®, Cutting Balloon®, tromboaspiración, IVUS y BCIA fue más bajo que el esperado, mientras que la edad, el shock cardiogénico, la emergencia y la ATC fallida resultaron factores asociados con mayor morbimortalidad.

Palabras clave > Infarto del miocardio - Angina inestable Angioplastia - Stents - Factores de riesgo Mortalidad Infarto del miocardio - Angina inestable - Angioplastia - Stents - Factores de riesgo - Mortalidad

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APPENDIX

Participating medical centers and physicians grouped by province

BUENOS AIRES, Clínica Constituyentes de Morón (Dr. Miguel Micelli, Dr. Antonio Scuteri, Dr. Martín Swistun), Clínica de las Mercedes (Dr. Daniel Mauro), Clínica IMA de Adrogué (Dr. Carlos Fernández Pereyra, Dr. Gastón Rodríguez Granillo), Clínica La Pequeña Familia (Dr. José M. Magni, Dr. Fernando Genna), Clínica San Nicolás (Dr. Roberto Fernández Viña, Dr. Oberdan Andrin), Hospital Carrillo (Dr. Miguel Micelli, Dr. Antonio Scuteri, Dr. Rodrigo Martín), Hospital El Cruce (Dr. Ricardo Sarmiento, Dr. Raúl Solernó, Dra. Ángeles Videla Lynch), Hospital Gral. de Agudos Gral. San Martín de La Plata (Dra. María C. Bayón, Dr. Marcelo Ventre, Dr. Diego Ríos), HIGA San José de Pergamino (Dr. Antonio Scuteri), Hospital Italiano Regional Sur de Bahía Blanca (Dr. Carlos Álvarez Iorio, Dr. Alejandro Álvarez, Dr. Pablo García Pacho), Hospital Privado del Sur de Bahía Blanca (Dr. Carlos Álvarez Iorio, Dr. Pablo García Pacho), Hospital Privado Ntra. Sra. de la Merced (Dr. Marcelo Ruda Vega, Dr. Juan Álvarez Sevillano), Hospital Pte. Perón de Avellaneda (Dr. Marcelo Cetera), Hospital Regional Español (Dr. Carlos Álvarez Iorio, Dr. Fernando Ordóñez, Dr. Pablo García Pacho), Instituto Cardiovascular Juncal (Dr. Carlos Gadda Thompson), Instituto Médico Agüero (Dr. Miguel Micelli, Dr. Antonio Scuteri, Dr. Martín Swistun), Instituto Médico Central de Ituzaingó (Dr. Alejandro Cherro, Dr. Raúl Solernó), Sanatorio del Pilar (Dr. Alejandro García Escudero), Sanatorio Modelo Quilmes (Dr. Ernesto M. Torresani, Dr. Guillermo R. Martino, Dr. Alejandro F. Moguilner).
CHACO, Cordis Instituto del Corazón (Dr. Manuel Sanjurjo, Dr. Oscar R.Codutti).
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CÓRDOBA, Sanatorio Allende (Dr. Hugo Londero, Dr. Francisco Paoletti, Dra. María J. Cabrera Ferreyra), Unidad Cardiológica de Río Cuarto (Dr. Rubén Montiel Cocco, Dr. Mauro Paulino).
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SAN LUIS, Instituto Cardiovascular Villa Mercedes (Dr. Alfredo D. Bravo).
SANTA FE, Clínica de Nefrología y Enfermedades Cardiológicas (Dr. Oscar Birollo, Dr. Víctor Moles), Sanatorio Garay (Dr. José H. Vicario, Dr. Juan P. Berduc, Dr. Matías Dallo, Dr. Luis Gerardo, Dra. Milagros Capellutto), Sanatorio Plaza (Dr. Rubén Piraino, Dr. Cristian Calenta), Sanatorio Rosendo García (Dr. Diego Kirschmann, Dr. Emanuel Luchesi), Sanatorio San Gerónimo (Dr. Oscar Birollo, Dr. Víctor Moles).
TIERRA DEL FUEGO, Sanatorio San Jorge (Dr. Marcelo J. Cardone).
TUCUMÁN, Centro Privado de Cardiología (Dr. Pedro Gallardo Galeas, Dr. Ricardo M. Falú), Instituto de Cardiología de Tucumán (Dr. Federico Barbaglia).