Evaluation of the Inappropriate Coronary Revascularizations according to the New Classification in a Cardiovascular Tertiary Referral Center.

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SUMMARY

Background
An inappropriate coronary revascularization entails risk which may be avoided for the patient and generates unnecessary costs for the health system. Recently, some experts in cardiovascular diseases have evaluated the criterion of adaptation of coronary revascularization indication in several common clinical scenes.

Objective
To identify the proportion of inappropriate coronary revascularization both percutaneous (PTCA) and surgical (MRS) according to the criterion of adaptation in a high complexity cardiovascular health center.

Material and Methods
From January to May 2009, all the patients referred to our center with the clinical indication of coronary angiography with significant coronary disease (stenosis ≥ 70%) were consecutively included and underwent percutaneous or surgical revascularization. In this group, the inappropriate rate of indication of coronary revascularization according to the criterion of adaptation recently published was evaluated.

Results
Of 568 catheterizations evaluated, 404 (71.2%) showed at least one lesion ≥ 70% of stenosis, 81 patients underwent a MRS (20%) and 295 a TCA (73%). From a total of 376 patients who underwent revascularization, the indication of coronary revascularization was considered as inappropriate in 15 (4%), all of them from the TCA group (15/295; 5%), while in the group of multi-arterial patients (n= 172) only 2 (1.2%) revascularizations were inappropriate.

Conclusions
The criterion of adaptation of coronary revascularization (percutaneous or surgical) in a high complexity cardiovascular center was inappropriate in a minority of cases. Such criterion is a potentially applicable tool both in the decision-making in those patients with coronary disease and in the control of quality of cardiology departments.

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Key words > Thoracic surgery – Coronary disease – Appropriate criterion

Abbreviations >

TCA	Transluminal coronary angioplasty	**ADA**	Anterior descending artery
MRS	Myocardial revascularization surgery		

BACKGROUND
The increase of prevalence of coronary disease together with the increase of therapeutic alternatives – a) myocardial revascularization surgery (MRS), b) transluminal coronary angioplasty (TCA) and c) medical treatment – has aroused great interest about the appropriate indication of each of these.

On the other hand, the inappropriate use of certain treatments should take a potential risk for the patient or an unnecessary cost for the health system. Recently, the American College of Cardiology Foundation (ACCF) together with other American entities (AHA, STS, AATS, SCAI, ASNC) has published the criterion of adaptation of coronary revascularization. (1) The objective of this study is to identify according to the criterion of adaptation the proportion of inappropriate coronary revascularization (TCA or MRS) in a high complexity cardiovascular center.

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MATERIAL AND METHODS

From January to May 2009, all the patients referred to our center with the clinical indication of coronary angiography who showed significant coronary disease (≥ 70% stenosis) were prospective and consecutively included, undergoing percutaneous or surgical revascularization. Demographic data and the type of revascularization of these patients were put into a unique database. In this group of patients the rate of indication of inappropriate coronary revascularization according to the criterion of adaptation recently published was retrospectively evaluated.

Appropriate criterion of coronary revascularization

RAND method has been developed together with the clinicians of the University of California, Los Angeles (UCLA), in order to synthesize the knowledge regarding certain topics of health care. (2) This method which represents a good tool to combine scientific progresses with the real medical world, (3) allows us establishing the rules for some good Clinical Practice Guidelines.

This process of evaluation described by RAND combines medicine based on evidence, published medical guidelines and the practical experience of the panel members. Recently, members of a panel of experts in cardiovascular diseases (ACCF/ AHA/ STS, AATS, SCAI, ASNC) evaluated the criterion of adaptation of coronary revascularization indication in some clinical scenes and it was classified as appropriate, inappropriate or uncertain. (1) Coronary revascularization was considered as appropriate when the expected benefits in terms of survival, symptoms, functional state and/or quality of life, exceed the risk involved in the procedure. Several clinical scenes according to the criterion of adaptation of appropriate/ uncertain or inappropriate revascularization indication according to the panel of experts are expressed in Table 1. Appropriate and uncertain indications were associated in one group as the main objective of the study is to identify the incorrect decision of revascularization. The criterion of adaptation of each revascularization method in multi-arterial patients according to the extent of the coronary disease, presence of diabetes Mellitus, and impaired left ventricle systolic function is detailed in Table 2.

According to the proposal and the results of SYNTAX study, (4, 5) we have calculated the SYNTAX score (6) in all the patients with multivessel disease (severe lesion of the left coronary trunk, triarterial or biarterial with severe lesion in the anterior descending artery (ADA) at proximal level) undergoing TCA or MRS.

Statistics

Continuous variables are presented as mean ± standard deviation (SD). Categorical variables are presented as percentages. Continuous variables were compared with the t-Student test. Categorical variables were compared with the chi-square test or with the Fisher's exact test, according to what was indicated. All the variables were compared according to the criterion of adaptation of coronary revascularization. Those values of $p < 0.05$ were considered statistically significant. In order to obtain the statistical analysis, the statistical package SPSS 11.0 was used.

RESULTS

Of 568 catheterizations evaluated, 404 (71.2%) showed at least one lesion ≥ 70% of stenosis; 32.2% of the patients had coronary disease of one vessel, 30% two-vessel disease and 37.1% three-vessel disease and/or left coronary trunk lesion. Regarding revascularization method (n= 404), 81 patients underwent MRS (20%) and 295 TCA (73%). Deferred TCA was performed in 58 cases (19.7%) and in 30 cases (10.1%) two stages were necessary. A total of 28 patients (7%) continued with medical treatment (Figure 1).

Of the 376 patients who underwent revascularization, the indication of coronary revascularization was considered as inappropriate in 15 (4%); all these patients belong to the group of TCA (15/295; 5%). Only 2/172 multi-arterial patients (1.2%) showed an inappropriate criterion for the revascularization method used (both undergoing a TCA, Table 2). These two patients showed severe lesion of left coronary trunk and refused surgical alternative.

All the patients medically treated (n=28) did not show appropriate criteria for coronary revascularization, due to absence of significant ischemia or presence of small lesions.

Demographic and angiographic characteristics

Demographic and angiographic basal characteristics of the patients who underwent revascularization according to the criterion of adaptation of coronary revascularization (appropriate/ uncertain or inappropriate) are detailed in Table 3.

A 67% of the cases (10/15) with inappropriate criterion were associated with silent myocardial ischemia of mild/moderate level and compromise of only one major epicardial vessel (with no lesion in the proximal ADA), while in other 3 cases (20%), the patients showed diagnosis of infarct with ST-segment elevation already evolved; these patients were asymptomatic and hemodynamic and electrically stable.

Of the subgroup of 104 patients with no previuos MRS with multivessel coronary disease (severe lesion of the left coronary trunk, triarterial or biarterial with severe lesion in the ADA at proximal level), 37 underwent a TCA and 67 a MRS. The average of SYNTAX score (31.5 ± 10.8 vs. 23.7 ± 7.2; $p < 0.001$) and the percentage of patients with high SYNTAX score (≥ 33) were greater in the group of MRS (47.1 vs. 14.8%; p= < 0.001, Figure 2).

DISCUSION

The following results of this study should be emphasized: a) the rates of revascularizations both global and percutaneous considered as inappropriate were low (4% and 5%, respectively); b) the decision of the therapeutic alternative in patients with multivessel coronary disease was considered as appropriate in most of the cases. The percutaneous alternative in patients with multivessel disease was suggested to those patients with acceptable SYNTAX score, which was ≥ 33 in less than 15% of the cases. In correlation with our clinical criterion, none of the 28 patients with significant lesions who continued under medical treatment had an appropriate criterion of revascularization.

Table 1. Criterion of adaptation for coronary revascularization (1)

1.	In those patients with acute myocardial infarct with ST- segment elevation, revascularization of the guilty vessel in those who appear within the first 12 hours to 24 hours in case of persistent symptoms, severe heart failure or hemodynamic or electric instability is considered appropriate.
2.	In those patients with acute myocardial infarct with ST-segment elevation who received a primary TCA or fibrinolytic treatment, revascularization of a non guilty vessel in the same hospitalization is considered appropriate only in patients with ventricular dysfunction and three-vessel disease, persistence of symptoms or presence of cardiogenic shock.
3.	In those patients with acute myocardial infarct with ST-segment elevation or acute coronary syndrome with no ST-segment elevation and successful percutaneous revascularization, a new revascularization in one or more vessels is considered appropriate in cases of recurrent ischemia or elevated functional risk.
4.	In those patients with acute coronary syndrome with no ST-segment elevation who show signs of increased risk of death or non fatal infarct, revascularization of the guilty vessel is appropriate.
5.	In those patients with acute coronary syndrome with no ST-segment elevation and signs of increased risk of death or non fatal infarct, revascularization of multivessel is considered appropriate in cases where the guilty artery cannot be clearly determined.
6.	In those asymptomatic patients, revascularization is considered appropriate except in presence of one or two affected vessels with low risk in non invasive tests or intermediate risk in absence of anginal treatment.
7.	In those asymptomatic patients with borderline stenosis (50% to 60%) in absence of high risk findings in non invasive tests or in absence of a more complete invasive evaluation (fractional flow reserve or intravascular ultrasound), revascularization is considered inappropriate
8.	In those patients with class I/II CCS, revascularization is considered appropriate except they show one or two vessels affected in association with low functional risk and absence of anginal treatment.
9.	In those patients with class I/II CCS, revascularization is considered appropriate except they show chronic total occlusion associated with low functional risk and absence of anginal treatment.
10.	In those patients with previous MRS with one or more lesions in arterial or venous bridges, revascularization is appropriate except in those asymptomatic cases associated with low risk due to functional test and absence of anti-anginal treatment.
11.	In those patients with previous MRS with one or more lesions in native arteries with no bridges, revascularization is appropriate except in asymptomatic cases associated with low risk due to functional test with or without anti-anginal treatment, or in asymptomatic associated with intermediate risk and absence of anginal treatment.

*CCS: Canadian Cardiovascular Society.

Table 2. Revascularization method in patients with multivessel coronary disease

	MRS			TCA		
	Without DM and without severe EF	DM	Severe EF	Without DM and without severe EF	DM	Severe EF
2 V + PX ADA	A	A	A	A	A	A
3 V	A	A	A	U	U	U
LCT	A	A	A	I	I	I
LCT + ≥ 1 V	A	A	A	I	I	I

V: Vessel. PX ADA: Proximal segment of the anterior descending artery. LCT: Left coronary trunk. DM: Diabetes Mellitus. Severe EF: Severe ejection fraction of left ventricle with severe deterioration. A: Appropriate. U: Uncertain. I: Inappropriate.

Table 3. Basal and angiographic characteristics

	Appropriate (n = 361)	Inappropriate (n = 15)	p
Age, years ± SD	64 ± 10	61 ± 6	0.65
Male, %	83.2	100	0.15
Diabetes Mellitus, %	24	33,3	0.14
Current nicotinism (smoking), %	18	13,3	0.62
Previous infarct, %	25.8	33,3	0.34
Previous TCA, %	33.9	50	0.14
Silent ischemia, %	15.3	67	< 0.001
Acute coronary syndrome, %	40.5	20	0.23
Number of vessels (1, 2, 3), %	32/30/38	60/33/7	< 0.001
Percutaneous revascularization, %	77.6	100	0.16

SD: Standard deviation.

The criterion of adaptation of coronary revascularization, recently developed by the most well-known cardiovascular entities of the United States, (1) is the first approach to establish or standardize the management of the decisions regarding coronary patient treatment. This criterion has an important clinical relevance, as it was agreed by consensus by a panel of prominent cardiologists, image specialists, interventional cardiologists and cardiovascular surgeons. The different clinical situations (Tables 1 and 2) were evaluated by each of the disciplines related to the care of coronary patients and also provided a revision of their bibliography and their own point of view. This tool, called method of analysis of the adaptation of a procedure, (3) is better than the medicine based on evidences to decide what action to take.

Of course, nothing replaces the medical judgement

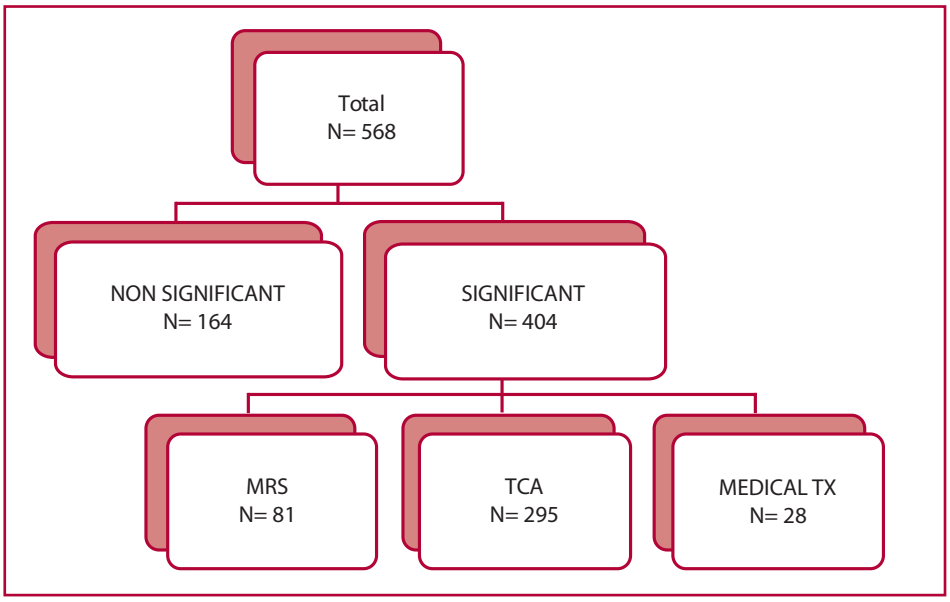

Fig. 1. Diagram of the study

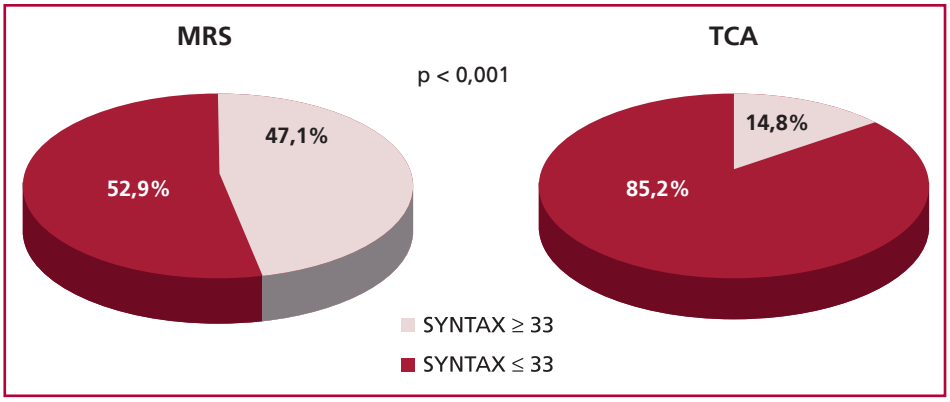

Fig. 2. Proportion of patients who underwent revascularizations with high SYNTAX score.

and the personalized medicine, where pros and cons of each intervention and the individual circumstance of the patient are added. On the other hand, is a relief to observe that the decisions of coronary revascularization according to the clinical criterion of an Argentine department of cardiology may be correlated to what is established by the mentioned guidelines.

Limitations

It should be necessary to mention that our study is retrospective and only involves 5 months of work in our center. This short-term does not allow us to analyze changes in our coronary revascularization marker over time. Nowadays, we do not have information about the clinical impact of an inappropriate criterion; undoubtedly this information would help to evaluate the usefulness of these guidelines.

CONCLUSIONS

The criterion of adaptation of coronary revascularization (percutaneous or surgical) in a high complexity cardiovascular center was inappropriate in a minority of cases. Such criterion is a potentially applicable tool both in the decision-making in those patients with coronary disease and in the control of quality of cardiology departments.

RESUMEN

Evaluación de las revascularizaciones coronarias denominadas inapropiadas por la nueva clasificación de adecuación de procedimientos en un centro cardiovascular de alta complejidad

Introducción

Una revascularización coronaria inapropiada conlleva un riesgo muchas veces evitable para el paciente y se traduce en gastos innecesarios para el sistema de salud. Recientemente, los miembros de un panel de expertos en enfermedades cardiovasculares evaluaron el criterio de adecuación de la indicación de revascularización coronaria en varios escenarios clínicos comunes.

Objetivo

Identificar la proporción de revascularización coronaria inapropiada tanto percutánea (ATC) como quirúrgica (CRM) conforme al criterio de adecuación

en un centro de alta complejidad cardiovascular.

Material y métodos

Desde enero hasta mayo de 2009 se incluyeron en forma consecutiva todos los pacientes derivados a nuestro centro con la indicación clínica de coronariografía que presentaron enfermedad coronaria significativa (estenosis ≥ 70%) y fueron sometidos a revascularización percutánea o quirúrgica. Se evaluó en este grupo la tasa de indicación inapropiada de revascularización coronaria conforme el criterio de adecuación recientemente publicado.

Resultados

De 568 cateterismos evaluados, 404 (71,2%) presentaron al menos una lesión ≥ 70% de esteno¬sis, 81 pacientes fueron sometidos a CRM (20%) y 295 a ATC (73%). Del total de 376 pacientes revascularizados, la indicación de revascularización coronaria se consideró inapropiada en 15 (4%), todos ellos del grupo ATC (15/295; 5%), mientras que en el grupo de pacientes multiarteriales (n = 172) sólo 2 (1,2%) revascularizaciones resultaron inapropiadas.

Conclusiones

El criterio de adecuación de revascularización coronaria (percutánea o quirúrgica) en un centro cardiovascular de alta complejidad ha resultado inapropiado en una minoría de los casos. Dicho criterio representa una herramienta potencialmente aplicable tanto en la toma de decisiones en pacientes con enfermedad coronaria como en el control de calidad de los servicios de cardiología.

Palabras clave > Cirugía torácica - Enfermedad coronaria - Criterio apropiado

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