

Spanish Registry on Cardiac Catheterization and Coronary Interventions. Twelfth Official Report of the Working Group on Cardiac Catheterization and Interventional Cardiology of the Spanish Society of Cardiology (1990-2002)

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The results of the Registry of the Working Group on Cardiac Catheterization and Interventional Cardiology of the Spanish Society of Cardiology for 2002 are presented. Data were obtained from 101 centers representing all cardiac catheterization laboratories in Spain; 95 centers performed mainly adult catheterization and 6 carried out only pediatric procedures.

In 2002, 97,609 diagnostic catheterization procedures were performed, including 83,667 coronary angiograms, representing a total increase of 5.1% in comparison to 2001. The population-adjusted rate was 2,053 coronary angiograms per 10⁶ inhabitants.

Coronary interventions increased by 11% in comparison to 2001, with a total of 34,723 procedures and a rate of coronary interventions of 850 per 10⁶ inhabitants. Coronary stents were the devices used most frequently, with 47,249 implanted in 2002, for a total increase of 20% in comparison to 2001. Stenting accounted for 91.7% of all procedures. Direct stenting was done in 13 768 procedures (43.2%). IIb-IIIa glycoprotein inhibitors were used in 9966 procedures (28.7%). Multivessel percutaneous coronary interventions were performed in 9,830 patients (28%), and ad hoc interventions were done in the course of diagnostic coronary angiography in 26,341 patients (76%).

A total of 4,766 percutaneous coronary interventions were done in patients with acute myocardial infarction, representing an increase of 23.9% in comparison to 2001, and accounting for 13.7% of all interventional procedures.

Of the noncoronary interventions recorded, we note the decrease in percutaneous mitral valvuloplasties (21.2%) and atrial septal defect closures (11.1%), and the slight increase in pediatric interventions (3.7%).

In conclusion, we emphasize the high rate of reporting by laboratories, which allows the Registry to compile data that are highly representative of the activity at cardiac catheterization laboratories in Spain

Key words: *Health registries. Coronary angiography. Coronary angioplasty. Stent. Cardiac catheterization.*

Full English text available at: www.revespcardiol.org

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Registro Español de Hemodinámica y Cardiología Intervencionista. XII Informe Oficial de la Sección de Hemodinámica y Cardiología Intervencionista de la Sociedad Española de Cardiología (1990-2002)

Se presentan los resultados del Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista de la Sociedad Española de Cardiología del año 2002. Se han recogido datos de 101 centros, la práctica totalidad de los laboratorios del país, de los que 95 realizaron su actividad sobre todo en pacientes adultos y 6 exclusivamente en pacientes pediátricos.

Se realizaron 97.609 estudios diagnósticos, con una cifra de 83.667 coronariografías, con un incremento de éstas del 5,1% respecto al año 2001 y una tasa de 2.053 coronariografías por millón de habitantes.

Se efectuaron 34.723 procedimientos de intervencionismo coronario, con un incremento del 11% respecto al año anterior y una tasa de 850 intervenciones por millón de habitantes. El *stent* intracoronario fue el dispositivo más empleado, en el 91,7% de los procedimientos, con 47.249 unidades utilizadas (incremento del 20%). El *stent* con carácter directo, sin predilatación, fue utilizado en 13.768 procedimientos, el 43,2% de los casos. Los inhibidores de la glucoproteína IIb/IIIa fueron utilizados en 9.966 procedimientos (28,7%). En 9.830 casos (28%) se efectuó un procedimiento en multivaso, y en 26.341 casos (76%) la intervención coronaria percutánea se realizó en la misma sesión que la coronariografía diagnóstica.

Se llevaron a cabo 4.766 procedimientos de intervencionismo en el infarto agudo de miocardio, lo que supone un 23,9% más respecto al año 2001 y el 13,7% del total de las intervenciones coronarias percutáneas.

En el intervencionismo no coronario destaca el descenso del número de valvuloplastias mitrales (21,2%), un descenso en los cierres percutáneos de comunicación interauricular en pacientes adultos (11,1%), y un ligero incremento de los procedimientos intervencionistas en pacientes en edad pediátrica (3,7%).

Finalmente, destacamos el alto grado de participación de centros en el registro, lo que hace que los datos aquí presentados sean representativos de la actividad hemodinámica en nuestro país.

ABBREVIATIONS

PCI: percutaneous coronary intervention.

Palabras clave: Registros sanitarios. Angiografía coronaria. Angioplastia coronaria. Stent. Cateterismo cardíaco.

INTRODUCTION

Information is paramount in medicine, particularly in rapidly evolving specialties such as cardiovascular medicine. Data obtained from health registries can be used by health professionals and health authorities, as well as by other organizations involved in the prevention and treatment of disease and for better distribution of health care resources. We present the results of the Registry of the Working Group on Catheterization and Interventional Cardiology of the Spanish Society of Cardiology for 2002. This is the twelfth consecutive year that the Registry has published its report in the REVISTA ESPAÑOLA DE CARDIOLOGÍA.¹⁻¹¹ As before, the report includes data from almost all hospitals involved, both public and private. The data can therefore be considered representative of the work undertaken in this field in Spain.

METHODS

Registry data were collected from a questionnaire sent to all catheterization laboratories in Spain (Annex 1). The questionnaire had a few modifications compared to previous versions and could be completed on paper, on a computer file on disk or online via the web page of the Working Group. Izasa collaborated in the distribution and collection of the questionnaires and data analysis was done by the Directors of the Working Group.

RESULTS

Infrastructure and resources

A total of 101 centers participated in the Registry (Annex 2); 95 working with adult patients (12 of these also treating children) and 6 treating children only.

Adult hospitals

The 95 adult centers had a total of 129 hemodynamic laboratories, of which 119 (92%) were digital. This represents 2.27 centers and 3.08 laboratories per million inhabitants. Two or more hemodynamic laboratories

were available in 29 centers and 86% of the centers had some sort of automated coronary quantification system. Thirty six centers (38%) were private and the other 59 (62%) belonged to the national health service.

Diagnostic and interventional procedures were undertaken by 98% of the hospitals and 2% undertook diagnostic procedures only. Cardiac surgery was performed in 78% (74/95). Coronary interventions were undertaken in 19 hospitals which did not perform cardiac surgery. A 24 hour emergency team was available in 63% of the centers.

Regarding medical staff, there were 273 doctors (2.8 per center; range, 1-7), a similar figure to 2001, with 6.52 specialists per million inhabitants. This figure is lower than the European mean in 1995 of eight specialists per million inhabitants.¹² There were 315 nurse technicians and 98 radiological technicians, with a mean of 4.3 per center (range, 1-15).

Pediatric hospitals

The 6 exclusively pediatric hospitals had 7 laboratories (all digital). They all undertook interventional procedures and 5 (83%) had a 24 hour emergency team on call. The staff were made up of 12 doctors (2 per center; range, 1-3) and 10 nurse or radiological technicians (1.6 per center; range, 1-3).

Diagnostic activity

A total of 97 609 diagnostic catheterization procedures were undertaken in Spain in 2002, an increase of 2.3% compared to 2001;¹¹ 83 667 of these were coronary angiograms, an increase of 5.1%. The population-adjusted rate was 2053 coronary angiograms per million inhabitants. Figure 1 shows the distribution of the diagnostic catheterization procedures over the last 10 years. Apart from the increase in coronary angiograms, there was a notable decrease in the number of diagnostic procedures in patients with valve disease (13%). The radial approach was used in 5148 procedures (6.2%), an increase of 312% compared to 2001. Percutaneous vessel closure devices (including both diagnostic and therapeutic procedures) were used in 14 357 cases (an increase of 53.8% compared to 2001), of which 8512 (59.2%) were with collagen and 5625 (39.2%) with suture.

A total of 34 centers (35.7%) surpassed the rate of 1000 coronary angiograms per year and 6 of these (6.3%) undertook more than 2000 coronary angiograms per year. However, 35 centers (36.8%) did not reach 500 coronary angiograms per year (Figure 2). This gives a rate of 880 coronary angiograms per center, a lower figure than that for most Western European countries in 1997^{13,14} and the 934 of the European Registry for 1999.¹⁴ However, the number of coronary angiograms per operator per year was 306,

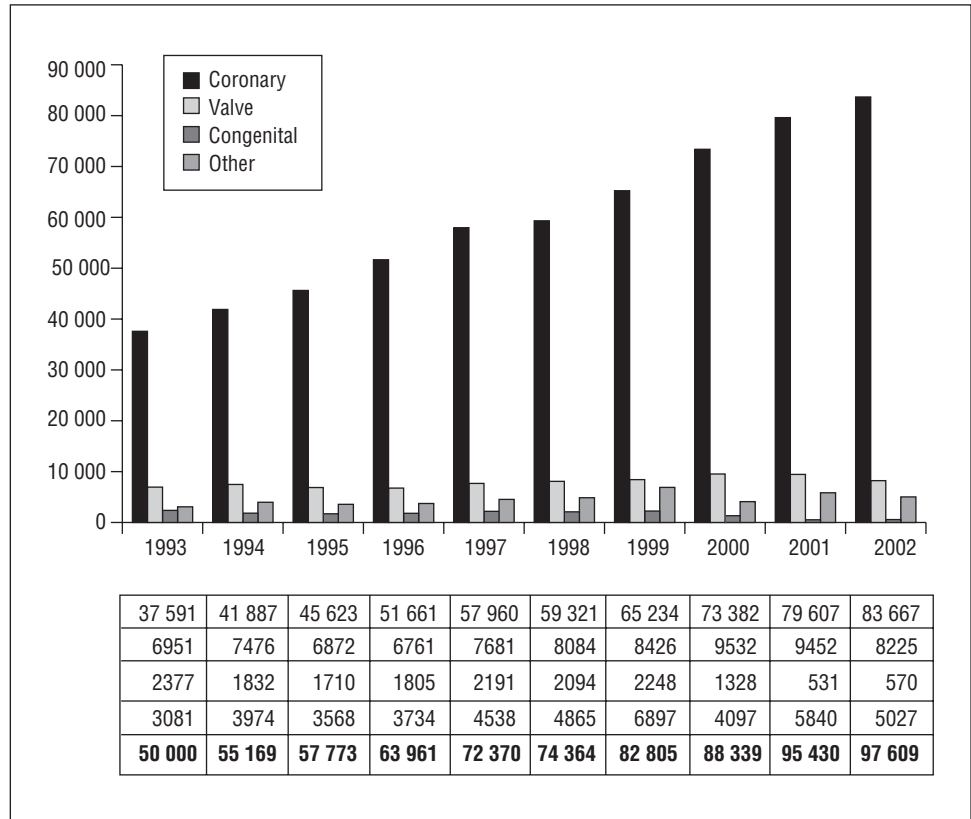


Fig. 1. Number and type of diagnostic procedure from 1993-2002.

higher than that for most countries for 1997.¹³ Of note is the fact that whereas private centers performed 394 coronary angiograms per center, public centers had a mean of 1177 coronary angiograms per center.

The growth rate in diagnostic procedures is tending to decrease in Spain. This has also been seen in other developed countries in Western Europe, where data for 1999 even showed a decrease in such countries as Switzerland or Austria,¹⁴ though their rates per million inhabitants were originally much higher than those for Spain. The number of coronary angiograms per million inhabitants varied greatly among the different autonomous regions in Spain (Figure 3).

Among intracoronary diagnostic procedures, intracoronary ultrasound and intracoronary pressure guidewire showed slight increases, though much lower than the differences for 2001 compared with 2000. There were 1712 intracoronary ultrasound procedures, an increase of 3.4% in comparison with 2001, and 1362 intracoronary pressure guidewire procedures, an increase of 2.2% compared to 2001. Intracoronary Doppler guidewire was used in 100 cases.

Coronary interventions

Coronary interventions increased by 11% compared to 2002, with a total of 34 723 percutaneous coronary interventions (PCI), representing 850 PCI per million

inhabitants (Figure 4). This figure is higher than that of the latest European Registry, published in 1999¹⁴ (714 angioplasties per million inhabitants) but lower than that already existing in 1999 in the leading countries for PCI, which were Germany, Iceland, France, Switzerland, Austria, Norway, Belgium and Luxembourg, in that order, and all of which surpassed the figure of 1000 PCI per million inhabitants in 1999.

The mean number of interventions per center was 373, with 273 per laboratory and 127 per operator. The mean numbers of PCI were 154 per private center and 505 per public center. The European mean was 429 PCI per center in 1999.¹⁴

The percentage of PCI per coronary angiogram was 41% in 2002 versus 39% in 2001; this percentage is higher than the European mean for 1999 (28%). At least one restenotic lesion was addressed during the intervention in 6.9% of cases. Multivessel PCI was performed in 9830 cases (28%) and ad hoc interventions were carried out during the diagnostic coronary angiographic procedure in 26 341 cases (76%); the European mean for ad hoc procedures in 1999 was 48%.¹⁴ The radial approach for PCI was used in 2214 cases (6.4%). There were 1039 PCI in grafts, 84.8% with saphenous veins and 15.2% with mammary arteries, and 493 PCI were undertaken in the common trunk of the left coronary artery, which was protected in 30% of cases and unprotected in 70%.

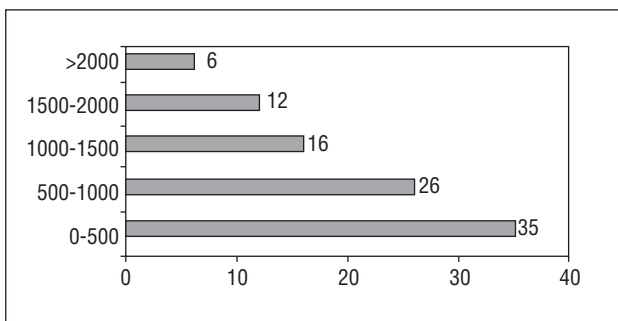


Fig. 2. Distribution of centers according to number of coronary angiograms.

Figure 5 shows the number of PCI per center. Despite the increased number of total procedures, 36.8% of all centers undertook fewer than 200 interventions per year and 60% fewer than 400. Figure 6 shows the number of PCI per million inhabitants in the different autonomous regions in Spain; the differences reflect those already observed for diagnostic procedures.

Glycoprotein IIb-IIIa inhibitors were used as coadjutant therapy in 9966 procedures, an increase over 2001 in both absolute terms (42%) and relative figures (28.7% of procedures vs 22.4% in 2001). Intra-aortic counterpulsation balloon was used in 706 cases and percutaneous extracorporeal circulation in eight cases.

Overall results of coronary interventions were similar to previous years, with a success rate of 94.7%, a non-complicated failure rate of 3.1% and a 2.2% failure rate with complications: 1% mortality, 1.1% acute myocardial infarction and 0.1% requiring emergency surgery.

Interventions in acute myocardial infarctions

A total of 4766 PCI were done in patients with acute myocardial infarction, representing an increase of 23.9% in comparison to 2001, and accounting for 13.7% of all interventional procedures (Figure 7). Of these, 59.2% were primary PCI (59.2% in 2001), 30% rescue (28.7% in 2001) and 10.8% facilitated (Figure

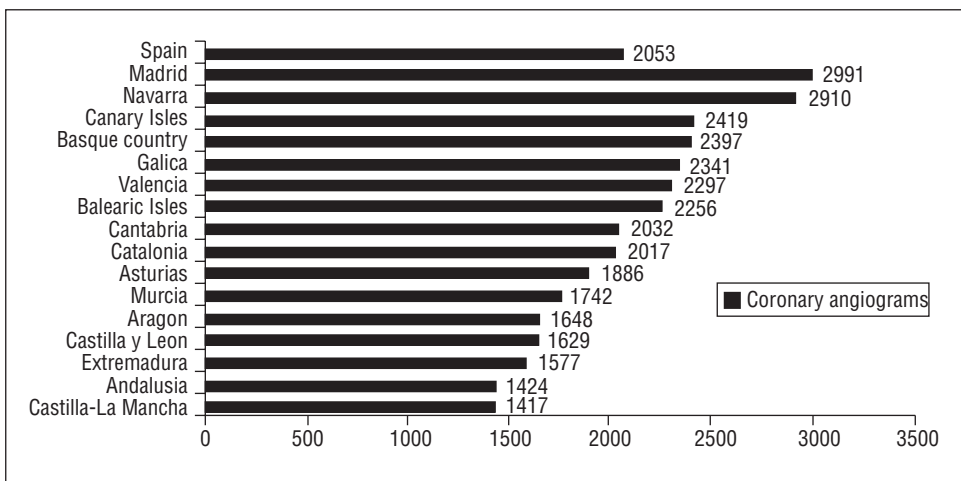


Fig. 3. Distribution of coronary angiograms per million inhabitants and autonomous region in Spain.

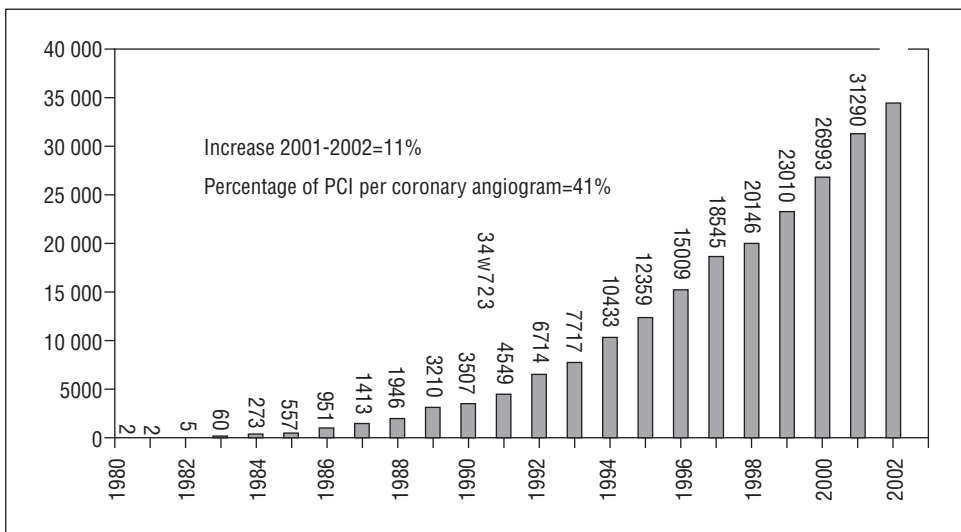


Fig. 4. Evolution of the number of percutaneous coronary interventions (PCI).

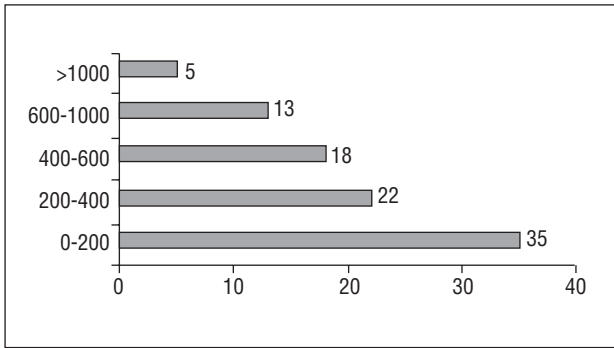


Fig. 5. Distribution of centers according to number of percutaneous coronary interventions (PCI).

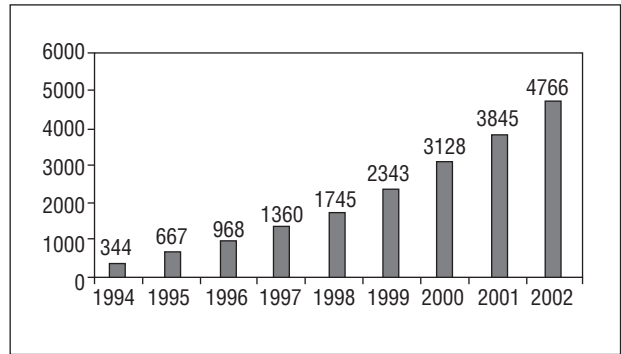


Fig. 7. Percutaneous coronary interventions (PCI) in patients with acute myocardial infarction. Historical evolution (1994-2002).

8). The 2821 primary PCI represented a 22.8% increase over 2001, and was thus greater than the percent increase in overall PCI, though this number still remains low in relation with the estimated number of acute myocardial infarctions per year in Spain.¹⁵ A total of 85 centers performed interventional procedures in patients with acute myocardial infarction. Of these, 14 did more than 100 PCI during the acute phase of the myocardial infarction, with most (59%) doing fewer than 50 PCI during the acute phase (Figure 9). Figure 10 shows the number of PCI done in patients with acute myocardial infarction per million inhabitants. A total of 605 PCI were undertaken during cardiogenic shock, which represents 12.7% of all cases of acute myocardial infarction.

Stents

Stents were the most commonly used devices in coronary interventions. A stent was used in 31 871 procedures, i.e. 91.7% of all interventions. The ratio of stents per procedure was 1.48 and the overall number of stents implanted was 47 249, of which 1906 (4.1%)

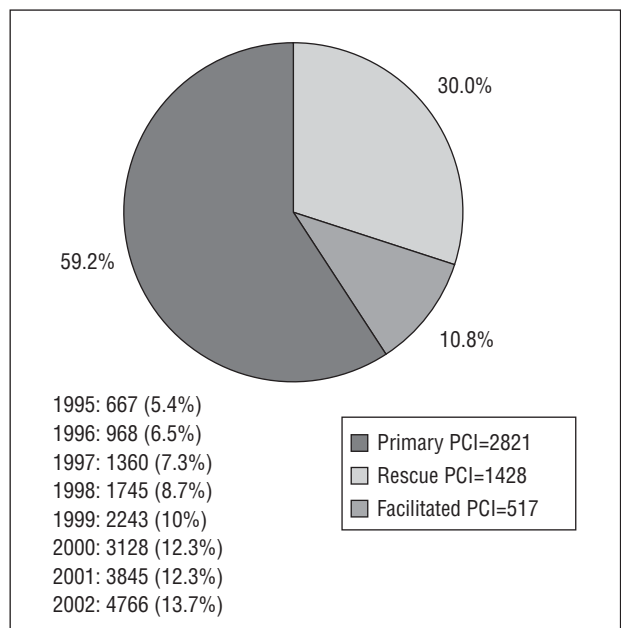


Fig. 8. Percutaneous coronary interventions (PCI) in patients with acute myocardial infarction. Distribution according to whether the PCI were primary, rescue or facilitated and percentage of total PCI since 1995.

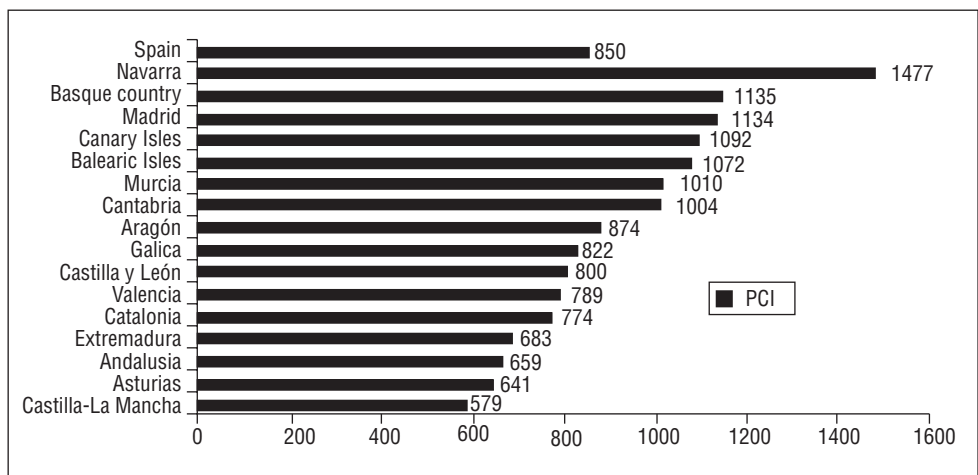


Fig. 6. Distribution of percutaneous coronary interventions (PCI) per million inhabitants and autonomous region in Spain.

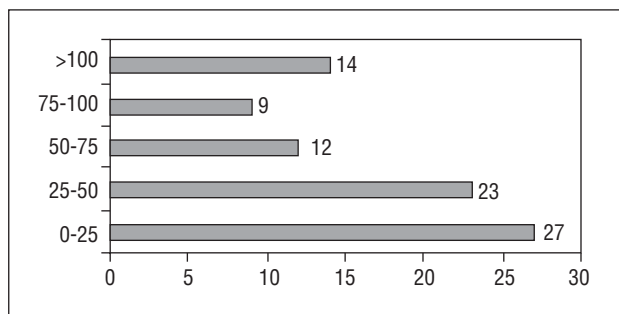


Fig. 9. Percutaneous coronary interventions (PCI) in patients with acute myocardial infarction. Distribution of centers according to number of procedures.

were drug-eluting stents. Direct stenting, with no balloon predilatation, was done in 13 768 stent procedures, representing 43.2% of all cases. Table 1 shows the number of stents implanted over recent years.

Other percutaneous interventional devices

Directional atherectomy was performed in 19 procedures in 4 centers, a marked decrease (83.3%) compared to 2001, and rotational atherectomy was done in 426 cases in 27 centers, a reduction of 4.2% in comparison with 2001 (Table 2). Notable among the other PCI was the increased use of a cutting balloon, used in 638 cases (an increase of 51%), thrombotic material

extraction devices, used in 499 procedures (an increase of 51.6%), and distal embolization protection devices, used in 200 cases (four times the number in 2001). Septal branch alcoholization was undertaken in 15 cases and embolization of fistulas in nine cases.

Finally, there was a marked 14.2% increase in brachytherapy using the beta system during 2002, from 105 cases in 2001 to 120 cases in 2002, with 98 restenotic lesions and 22 *de novo* lesions. The intervention was successful in 118 lesions and there were 2 cases of non-fatal myocardial infarction.

Non-coronary interventions in adults

During 2002 a total of 397 adult valvuloplasties were undertaken in 41 centers, a decrease of 17% compared to 2001. This decrease was mainly explained by the 21.2% decrease in the number of mitral valvuloplasties, from 452 to 356 (Figure 11). The remaining non-coronary interventions were 17 aortic valvuloplasties and 24 pulmonary valvuloplasties.

Percutaneous devices were used to close atrial septal defects in 143 cases, an 11.1% reduction compared with 2001. Interventions were successful in 90.9% of cases, failed with no complications in 6.9% and with complications in 2.2% of cases. A further 50 procedures were performed in adult patients with congenital heart disease.

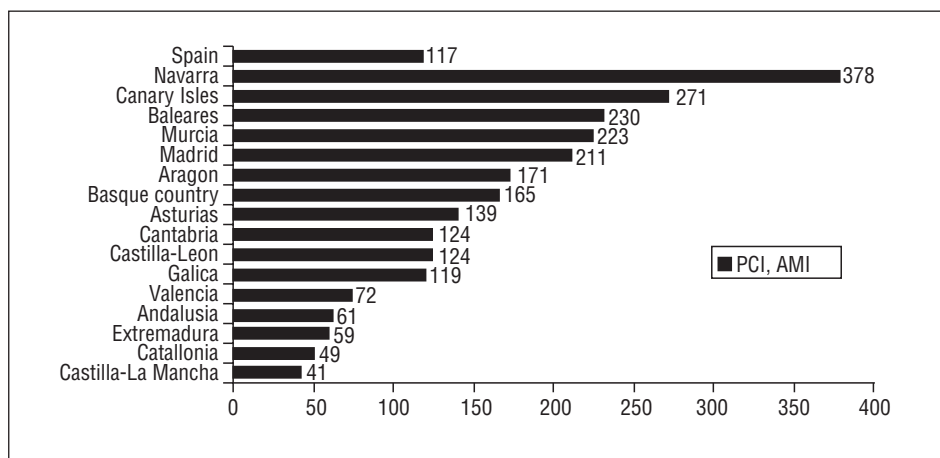


Fig. 10. Distribution of percutaneous coronary interventions (PCI) in patients with acute myocardial infarction per million inhabitants and autonomous region in Spain.

TABLE 1. Coronary stents from 1996-2002

	1996	1997	1998	1999	2000	2001	2002
Centers, n	66	69	70	80	87	94	93
Procedures, n	3418	7104	14 497	17 783	22 580	27 586	31 871
Units implanted, n	8873	14 170	19 378	22 946	29 504	39 356	47 249
Stents per procedure, n	1.26	1.24	1.34	1.3	1.3	1.43	1.48
Cases with stents per total PCI, %	27.6	47.3	61.5	71.9	77.3	88.1	91.7
Drug-eluting stents, n							1906
Drug-eluting stents, %							4.1
Direct stent, n					8778	11 280	13 768
Direct stent, %					38.9	40.9	43.2

TABLE 2. Rotational atherectomies (RA) and directional atherectomies (DA) from 1995-2002

	1995	1996	1997	1998	1999	2000	2001	2002
RA								
Procedures	330	367	554	549	473	461	445	426
Centers	23	18	33	36	32	28	33	27
DA								
Procedures	186	96	92	81	52	57	114	19
Centers	23	12	8	6	5	4	9	4

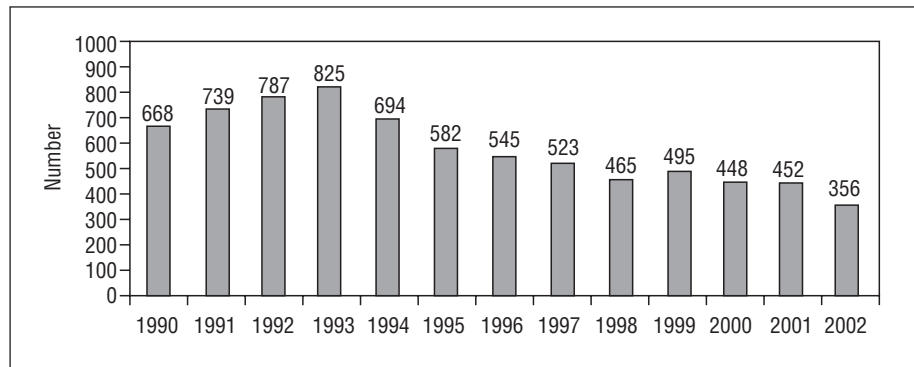


Fig. 11. Historical evolution of number of mitral valve procedures since 1990.

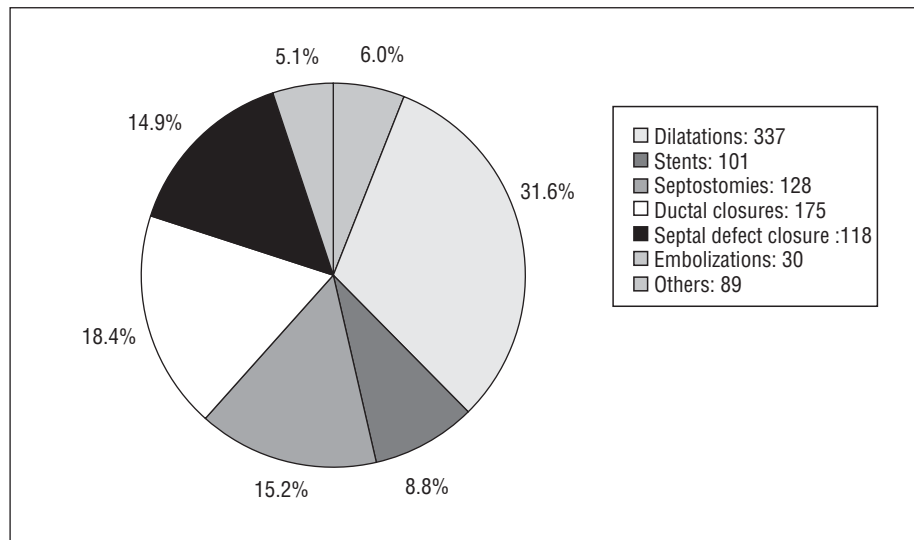


Fig. 12. Distribution of pediatric interventions.

Interventions in pediatric patients

A total of 978 interventional procedures were done in children in 21 centers, an increase of 3.7% compared to 2001. These included 337 dilatations, 118 atrial septal defect closures and 171 ductal closures. Figure 12 shows the most frequent procedures.

CONCLUSIONS

One of the most important missions of the Working Group on Catheterization and Interventional Cardiology of the Spanish Society of Cardiology is to

provide cardiologists with the annual data regarding their activity in Spain. Awareness of these data by health professionals, health authorities and the general public may result in better approaches to cardiovascular disease and in improved distribution of health care resources.

Diagnostic activity was increased in patients with ischemic heart disease, especially activity related with therapy, with the greatest percent increase in PCI in patients with acute myocardial infarctions. Great variation was noted, however, between the different autonomous regions of Spain regarding the number of diagnostic and therapeutic procedures.

Multivessel PCI was undertaken in 28% of all procedures and 91.7% of procedures involved placement of a stent, with direct implantation in 43.2% of cases. Both the ratio of PCI to coronary angiograms and the percentage of ad hoc PCI are among the highest in Europe.

Although the number of atherectomies fell, there was a notable increase in the use of thrombotic material extraction devices and distal embolization protection devices. Glycoprotein IIb-IIIa inhibitors were used in 28.7% of cases.

The number of PCI in patients with acute myocardial infarction rose by 23.9% compared to 2001, with a 22.8% increase in primary PCI.

Finally, the number of mitral valvuloplasties and percutaneous closures of atrial septal defects fell. Interventional activity in pediatric patients rose by 3.7%.

REFERENCES

1. Mainar V, Gómez Recio M, Martínez Elbal L, Pan M. Registro Nacional de actividad Hemodinámica y Cardiología Intervencionista en los años 1990 y 1991. *Rev Esp Cardiol* 1992;45:622-6.
2. Pan M, Martínez Elbal L, Gómez Recio M, Mainar V. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1992. *Rev Esp Cardiol* 1993;46:711-7.
3. Gómez Recio M, Martínez Elbal L, Pan M, Mainar V. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1993. *Rev Esp Cardiol* 1994;47:783-90.
4. Elízaga J, García E, Zueco J, Serra A. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1994. *Rev Esp Cardiol* 1995;48:783-91.
5. Zueco J, Elízaga J, Serra A, García E. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1995. *Rev Esp Cardiol* 1996;49:714-22.
6. Serra A, Zueco J, Elízaga J, García E. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1996. *Rev Esp Cardiol* 1997;50:833-42.
7. Soriano J, Alfonso F, Cequier A, Moris C. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1997. *Rev Esp Cardiol* 1998;51:927-38.
8. Soriano J, Alfonso F, Cequier A, Moris C. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1998. *Rev Esp Cardiol* 1999;52:1105-20.
9. Soriano J, Alfonso F, Cequier A, Moris C. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 1999. *Rev Esp Cardiol* 2000;53:1626-38.
10. Hernández JM, Goicolea J, Durán JM, Augé JM. Registro de actividad de la Sección de Hemodinámica y Cardiología Intervencionista del año 2000. *Rev Esp Cardiol* 2001;54:1426-38.
11. Hernández JM, Goicolea J, Durán JM, Augé JM. Registro Español de Hemodinámica y Cardiología Intervencionista. XI Informe Oficial de la Sección de Hemodinámica y Cardiología Intervencionista de la Sociedad Española de Cardiología (años 1990-2001). *Rev Esp Cardiol* 2002;55:1173-84.
12. Windecker S, Maier-Rudolph W, Bonzel T, Heyndrickx G, Lablanche JM, Morice MC, et al, on behalf of the working group Coronary Circulation of the European Society of Cardiology. Interventional Cardiology in Europe in 1995. *Eur Heart J* 1999;20: 484-95.
13. Maier W, Camici P, Windecker S, Pfiffner D, Wijns W, Meier B. The European Registry of Cardiac Catheter Interventions 1997. *Eur Heart J* 2002;22:1903-7.
14. Rotter M, Pfiffner D, Maier W, Zeiher A, Meier B. Interventional cardiology in Europe 1999. *Eur Heart J* 2003;24:1164-70.
15. Marrugat J, Elosua R, Martí H. Epidemiología de la cardiopatía isquémica en España: estimación del número de casos y de las tendencias entre 1997 y 2005. *Rev Esp Cardiol* 2002;55: 337-46.

ANNEX 1. Questionnaire for the report of the Working Group on Cardiac Catheterization and Interventional Cardiology - 2002

1. DEMOGRAPHIC DATA

Hospital:.....
 Address:.....
 Zip code:
 Province:.....
 Telephone:..... Extension:
 Fax:.....
 E-mail:.....
 Contacting doctor (responsible for the data):.....

2. LABORATORY DATA

Number of laboratories:
 Conventional:
 Digital:
 Number of staff doctors:
 Number of staff doctors who do PCI:
 Number of nurse technicians:
 Number of radiological technicians:
 24 hour emergency service:.....YES: NO:
 Cardiovascular surgery available at the center:.....YES: NO:
 Activity database available:

3. DIAGNOSTIC ACTIVITY

Total number of diagnostic procedures:
 Number of coronary angiograms:
 Number of studies in patients with valve disease:
 Number of endomyocardial biopsies:
 Number of adults with congenital disease:
 Number of pediatric patients:
 Other:

Number of procedures with radial approach:

A single diagnostic procedure is considered to be the combination of right and left cardiac catheterization whether or not accompanied by a coronary angiogram. A complete study in a patient with valve disease who also has a coronary angiogram is a study in a patient with valve disease. An isolated coronary angiogram in a patient with valve disease is to be counted as a coronary angiogram. A biopsy in a patient with a coronary angiogram is one single procedure and should be counted as a biopsy so as not to interfere with the number of percutaneous coronary interventions (PCI)

4. OTHER DIAGNOSTIC CORONARY STUDIES

Quantitative coronary angiogram: YES: NO:
 Number of studies with echocardiography:
 Number of studies with pressure guidewire:
 Number of studies with Doppler guidewire:

The intracoronary studies are not to be counted separately within the full number of procedures. For example, a diagnostic coronary angiogram accompanied by a pressure guidewire study is one single procedure; a PCI with IVUS is one single procedure.

5. CORONARY INTERVENTION ACTIVITY

Total number of procedures:*
 Number of multivessel procedures:.....
 Number of procedures during the same diagnostic session:.....
 Number of restenosis procedures:**
 Number of saphenous vein procedures:
 Number of mammary artery procedures:
 Number of trunk procedures:
 Protected:.....
 Unprotected:.....
 Number of procedures with balloon only:
 Number of procedures with radial approach:
 Number of procedures with anti-IIb-IIIa:
 Aciximab: Eptifibatide: Tirofiban:
 Number of procedures with ionic contrast
 Number of procedures with non-ionic contrast:.....

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RESULTS.

Total number of successful procedures:

Total number of failed procedures without complications:

Total number of procedures with important complications:

Non-fatal AMI:

Emergency surgery (24 hours):.....

Hospital death:

*A coronary therapeutic procedure is considered to be attempted treatment of one or more coronary lesions, provided an attempt is made at introducing a guide wire in a coronary artery. However many devices are used in the same procedure (stent, IVUS, atherectomy, etc.) it is to be counted as just one procedure. **At least one of the lesions treated in a session is restenotic.

6. SUPPORT METHODS FOR INTERVENTIONAL PROCEDURES

Number of procedures with intra-aortic counterpulsation balloon:

Number of procedures with percutaneous extracorporeal circulation:

7. INTERVENTIONAL ACTIVITY IN ACUTE MYOCARDIAL INFARCTION

Total number of procedures related with AMI*.

Primary PCI:.....

Rescue PCI:*

Facilitated PCI:**

Results:

Successful without complications:

Important complications:

Emergency surgery:

Hospital death:

Number of cases in cardiogenic shock (during the first 24 hours post AMI):

Results:

Successful without complications:

Important complications:

Emergency surgery:

Death:

Number of procedures with a stent:

Number of procedures with a balloon only:.....

Number of procedures with anti-IIb-IIIa:

Number of procedures with thrombus extraction devices:

Number of procedures with distal embolization protection:

*Rescue PCI: after failed thrombolytic therapy during the first 24 hours post AMI.

**Facilitated PCI: elective after thrombolytic therapy (with or without anti-IIb/IIIa) during the first 24 hours post AMI.

8. CORONARY STENT

Total number of procedures:

Total number of stents implanted:.....

Total number of procedures without predilatation:*

Number of drug-eluting stents:

*All lesions in one session treated without predilatation.

9. OTHER DEVICES/PROCEDURES:

Total number of procedures:

Directional atherectomy:

Rotational atherectomy:

Other types of atherectomy:

Coronary laser:.....

Laser guidewire:.....

Transmyocardial laser:

Radiofrequency balloon:.....

Ultrasound therapy:.....

Cutting balloon:

Thrombotic material extraction devices:.....

Distal embolization protection devices:

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(Continuation)

Percutaneous closure devices:

- With collagen:
- With suture:.....
- Others:

Septal branch ablation:.....

Embolization of fistulas:

10. BRAQUITERAPY

Total number of procedures:

Beta:

Gamma:.....

Total number of lesions:.....

De novo:.....

Restenotic:

Initial results:.....

Total number of successful procedures:

Total number of important complications:

Death:.....

Non-fatal AMI:

Surgery:

11. INTERVENTIONS IN ADULT PATIENTS WITH VALVE DISEASE

Percutaneous mitral commissurotomy:

Total number of procedures:

Result:.....

Successful:.....

Complications:

Cardiac blockade:

Severe mitral insufficiency:

Stroke:.....

Death:.....

Aortic valvuloplasty:

Total number of procedures:

Results:

Successful:.....

Complications:

Severe mitral insufficiency:

Stroke:.....

Death:.....

Pulmonary valvuloplasty:

Total number of procedures:

Results:

Successful:.....

Complications:

Cardiac blockade:

Death:.....

12. PROCEDURES IN ADULT PATIENTS WITH CONGENITAL DISEASE

Atrial septal defect closures:

Number of procedures:

Successful:

Failure without complications:

Complications:

Death:

Others:

Aortic coarctation:

Other procedures in adults with congenital diseases (specify):

(Continue next page)

(Continuation)

13. THERAPEUTIC PROCEDURES IN PEDIATRIC PATIENTS

Dilatations:

- Pulmonary valve:.....
- Aortic valve:.....
- Aortic coarctation:
- Subaortic stenosis:.....
- Pulmonary branches:
- Other dilatations:

Stents implanted in:

- Pulmonary artery branches:
- Aortic coarctation:
- Ductus:.....
- Other sites:.....

Atrial septostomy in:

- ICU:.....
- Catheterization laboratory:.....

Ductus closure:

Atrial septal defect closures:

Embolizations:

Others:

14. OBSERVATIONS AND COMMENTS:

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ANNEX 2. Report of the Working Group on Cardiac Catheterization and Interventional Cardiology. Participating Laboratories in 2002

ANDALUSIA	CATALONIA
Cádiz	Barcelona
Hospital Universitario Puerta del Mar	Ciutat Sanitaria i Universitaria de Bellvitge, L'Hospitalet de Llobregat
Hospital Universitario de Puerto Real	Hospital Clínic de Barcelona
Clínica Nuestra Señora de la Salud	Hospital de la Santa Creu i San Pau
Córdoba	Hospital Universitario Germans Trias i Pujol, Badalona
Hospital Universitario Reina Sofía	Hospital General Vall d'Hebron
Granada	Hospital General de Catalunya
Hospital Universitario Virgen de las Nieves	Centre Cardio-Vascular Sant Jordi
Huelva	Centro Médico Teknon
Hospital Juan Ramón Jiménez	Clínica Corachan
Jaén	Clínica Quirón
Hospital Universitario Ciudad de Jaén	Hospital de Barcelona, SCIAS
Málaga	Clínica Sagrada Familia, UCRISA
Complejo Hospitalario Carlos Haya	Clínica La Alianza, ANGIOCOR
Hospital Universitario Virgen de la Victoria	Girona
Hospital Costa del Sol, Marbella	Hospital Dr. Josep Trueta
Clínica El Ángel	Tarragona
Clínica Parque San Antonio	Hospital Juan XXIII
Clínica Santa Elena	MADRID COMMUNITY
Seville	Hospital Puerta de Hierro
Hospital Universitario Virgen Macarena	Hospital Universitario 12 de Octubre
Hospital Universitario Virgen del Rocío	Hospital Clínico San Carlos-Complejo Hospitalario
ARAGON	Hospital de la Princesa
Zaragoza	Hospital General Universitario Gregorio Marañón
Hospital Clínico Universitario	Hospital Universitario La Paz
Hospital Universitario Miguel Servet	Hospital Ramón y Cajal
ASTURIAS	Fundación Jiménez Díaz
Hospital Central de Asturias	Hospital Militar Gómez Ulla
Centro Médico de Asturias	Instituto de Cardiología de Madrid
BALEARIC ISLES	Clínica Nuestra Señora de América
Hospital Son Dureta	Clínica Moncloa
Policlínica Miramar	Clínica Ruber
Clínica Rotger	Hospital Ruber Internacional
CANARY ISLES	Sanatorio La Milagrosa
Las Palmas	Centro Médico Zarzuela
Hospital de Gran Canaria Dr. Negrín	Clínica Montepíncipe
Hospital Universitario Insular de Gran Canaria	VALENCIAN COMMUNITY
Tenerife	Alicante
Hospital Universitario de Canarias	Hospital General Universitario de Alicante
Complejo Hospitalario Nuestra Señora de la Candelaria	Hospital de San Juan
Hospital Rambla	Sanatorio Perpetuo Socorro
CANTABRIA	Hospital Clínica Benidorm
Hospital Universitario Marqués de Valdecilla	Castellón
CASTILLA AND LEON	Hospital General de Castellón
Leon	Valencia
Hospital de Leon	Hospital Clínico Universitario
Salamanca	Hospital General Universitario de Valencia
Hospital Universitario de Salamanca	Hospital Universitario La Fe
Valladolid	Hospital Universitario Dr. Peset
Hospital Universitario de Valladolid	Hospital de la Ribera, Alzira
Centro Médico de Intervencionismo, Hospital Campo Grande,	Hospital Nueve de Octubre, GESNOU, S.A.
Valladolid	EXTREMADURA
CASTILLA-LA MANCHA	Badajoz
Albacete	Hospital Universitario Infanta Cristina
Ibérica de Diagnóstico y Cirugía	Cáceres
Toledo	Hospital Virgen de Guadalupe
Hospital Virgen de la Salud	

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GALICIA

La Coruña

Complejo Hospitalario Juan Canalejo

Complejo Hospitalario Universitario de Santiago de Compostela

Instituto Médico-Quirúrgico San Rafael

Sanatorio Quirúrgico Modelo

Pontevedra

Hospital de Meixoeiro, MEDTEC, Vigo

MURCIA

Hospital Universitario Virgen de la Arrixaca

Sanatorio San Carlos

Clínica Nuestra Señora de la Vega

NAVARRA

Hospital de Navarra

Clínica Universitaria de Navarra

BASQUE COUNTRY

Alava

Hospital Txagorritxu, Vitoria

Guipúzcoa

Policlínica Guipúzcoa, San Sebastián

Vizcaya

Hospital de Basurto, Bilbao

Hospital de Cruces, Baracaldo

Hospital de Galdakao, Galdakao

Clínica V. San Sebastián, Bilbao

CENTERS WITH DIFFERENTIATED PEDIATRIC ACTIVITY

Barcelona

Hospital Sant Joan de Déu

Madrid

Hospital La Paz

Hospital Ramón y Cajal

Malaga

Hospital Maternoinfantil, Complejo Carlos Haya

Seville

Hospital Virgen del Rocío

Valencia

Hospital Universitario La Fe