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NATIONAL AUSTRIAN PTCA REGISTRY 1998

PTCA REGISTRY
1998

Zusammenfassung

Eine komplette und kontrollierte Nationale Datenbank, offen für einen Auditor, ist die Voraussetzung für Qualitätskontrolle, Qualitätsmanagement und Verbesserungen. Wir vergleichen in Österreich invasive (Koronarangiographie) und interventionelle (PTCA = PCI) Resultate von Jahr zu Jahr und von Region zu Region seit dem Jahr 1990. Gleichzeitig führen wir Monitorvisiten (Audits) durch und nehmen an der Europäischen Datensammlung teil.

31.419 diagnostische Koronarangiographien (CA) und 8.559 PTCA (= PCI) wurden an 27 Erwachsenenzentren (22 davon führen PTCA durch) während des Jahres 1998 in Österreich durchgeführt. Das entspricht einer Zunahme von 5,4 % bei Angiographien (CA) und 11,1 % bei PTCA (= PCI) gegenüber 1997. 70 % der PTCA (allerdings nur in jenen Zentren, welche dies berichten) werden während der diagnostischen Angiographie (CA) ausgeführt, eine direkte PTCA wegen oder während eines Myokardinfarktes in 5,5 %. Insgesamt 5.838 Stents (bei 68 % der PTCA-Fälle) wur-

den implantiert. Der internationale Vergleich zeigt Österreich unter den Spitzenreitern mit 3927 CA und 1070 PTCA pro Million Einwohner. Als Konsequenz aus einer diagnostischen Angiographie resultiert in 39 von 100 Fällen eine Revaskularisation, sei es durch PTCA oder durch Operation. Die Spitalssterblichkeit betrug nach PTCA 0,5 %, die Rate Notfallmäßiger Operationen 0,15 % nach PTCA, während ein Myokardinfarkt im Herzkatheterlabor als Folge des Eingriffes in 0,9 % auftrat. In den Jahren 1993 bis 1996 stieg die Mortalität infolge Notfallmäßiger Bypassoperationen nach fehlgeschlagener PTCA von 3,3 über 8,3 und 18,3 auf 28,6 %, fiel dann auf 8,3 % im Jahr 1997 und stieg 1998 wieder auf 15,4 % (das sind 2 von 13 Fällen). Ähnlich wie in den Vorjahren wurde auch 1998 innerhalb jener 22 Zentren mit PTCA-Aktivität der Ischämienachweis vor PTCA in 3.644 Fällen (15 Zentren), die Primärerfolgsrate in 6.390 Fällen (18 Zentren) sowie eine Kontrollergometrie innerhalb drei Monaten nach PTCA bei 1.524 Fällen (9 Zentren) dokumentiert. Leicht zunehmend ist der Anteil der Typ B-Läsionen von 34 über 37 auf 47 %

von 1996 bis 1998, bei gleichzeitiger Zunahme der Typ C-Läsionen auf 24 %. Die mittlere Fallbelastung für alle 141 Ärzte, die diagnostische Koronarangiographien 1998 durchführten, betrug 222 Fälle im Jahr. Die 81 „PTCA-Ärzte“ führten durchschnittlich 106 Interventionen aus. Ärzte mit überdurchschnittlicher Fallzahl befürworten die Dokumentation der Fallbelastung.

Österreich scheint eine jener Nationen weltweit zu sein, die seit Jahren eine komplette und kontrollierte nationale Datenbank für invasive und interventionelle Kardiologie unterhält. Darüberhinaus veranstalten wir Monitorvisiten und Rückantworten mit Diskussion der Ergebnisse, wie bei einem Audit-Verfahren. Höhere Fallzahlen bei geringeren Komplikationsraten trotz eher schwerwiegender Krankengutes sprechen für eine gleichzeitige Qualitätsverbesserung. Damit ist allerdings nicht erwiesen, daß das eine (Qualitätsverbesserung) ursächliche Folge des anderen (Audit) ist.

<http://gin.uibk.ac.at/iik>

SUMMARY

A complete and controlled national database, wide open for audit, is the prerequisite for quality control, quality management and improvement. In Austria we are comparing invasive (coronary angiography) and interventional (PTCA) outcome from year to year and from region to region since the year 1990. At the same time we perform monitor visits (audit) and participate in the European data collection.

31,419 diagnostic coronary angiographies (CA) and 8559 PTCA were done in 27 adult-centers (22 of

them perform PTCA) in Austria during the year 1998. This is an increase of 5.4 % concerning coronary angiography and a 11.1 % increase in PTCA compared to 1997. 70 % of PTCA (concerning only those centers, who report) were done during the diagnostic study (CA), direct PTCA for ongoing infarction was performed in 5.5 %. In 5838 cases stents (68 % of the PTCA cases) were implanted. International comparison shows Austria under the top nations with 3927 CA and 1070 PTCA per one million inhabitants. The consequence of PTCA plus coronary artery bypass surgery per 100 diagnostic cases is 39 % . Hospital mortality after PTCA was 0.5 %, emergency bypass surgery rate after PTCA 0,15 % and a

myocardial infarction due to PTCA in the cath-lab occurred in 0.9 %. Mortality after emergency surgery due to failed PTCA rose from 3.3 % over 8,3 % and 18.3 % to 28.6 % during the years 1993 to 1996 and declined to 8.3 % in 1997 and 15.4 % (2/13 cases) in 1998. Out of 22 centers with PTCA-activity during 1998, ischaemia before PTCA was reported in 3644 patients in 15 centers, primary-success-rate in 18 centers concerning 6.390 patients and a controlling exercise stress test within 3 months after PTCA in 9 centers for 1524 patients. The culprit lesion was a type B lesion in 34 % in the year 1996 and in 37 % in the year 1997 and in 47 % in 1998, at the same time type C lesions increased

to 24 %. The mean case load for all the 141 physicians, performing coronary angiography in 1998, was 222 per year, concerning the 81 PTCA-physicians the mean case load was 106 per year. Physicians with over the average results affirm investigation of case load.

Austria seems to be one of the nations world-wide to support a complete national database with controlled numbers and parameters since years, including monitor visits (audits) and feedback reports. We reached continuous quality improvement concerning lower mortality at a higher ratio of interventional (PTCA) per diagnostic procedures in a more severe setting. This does not mean that the one is the consequence of the other.

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PREFACE

To compare quantitative numbers and some distinct qualitative items from one year to another and between different countries the European Society of Cardiology conducts a registry [1–3]. Concerning invasive and interventional cardiology Austria has contributed to this registry since the year 1992 not only complete numbers of all the Austrian catheterization-laboratories (Cath-Labs), but has also performed a controlling-procedure including monitor visits [4–13]. Austria is a country with additional experience in an audit-procedure by complete monitor visits since 1992 [14].

Austria follows a minimal basic invasive/interventional data set on

the basis of the existing data set of the Working Group Coronary Circulation of the European Society of Cardiology, published for Switzerland and Europe [1, 2, 15–18]. Countries like Denmark, Sweden, Switzerland and the Netherlands have existing and complete national databases similar or almost identical to the promoted European data set.

This paper is a summary of the seventh annual survey on cardiac interventions in Austria since 1992. The data for the year 1998 are the main focus of the paper. Where essential for calculation of growth rates and purposes of comparison, data from previous survey periods 1992–1997 have been included. The latest monitor visits took place from February 18th to June 5th 1998.

METHOD

The exact and intense prescription of the historical beginning and conduction of our registry has been published elsewhere [4–13]. Briefly in the year 1992 the authors and the former president of the Austrian Society of Cardiology and the chairman of the Working Group Coronary Intervention started with the promotion of monitor visits in Austrian Cath-Labs and published the first data [4, 5]. Definition of data and parameters is identical to the questionnaire of the European statistics [1, 17]. "New Devices" like stenting are defined as subgroup of PTCA.

26 adult and 4 pediatric centers were visited in 1998. There is one single center in Austria, which

was not visited, since they started in autumn of 1998. 22 centers perform coronary angiography as well as PTCA, and 5 centers performed only coronary angiography in 1998. These centers include all the Austrian activities in valvuloplasty and electrophysiologic ablation as well.

The four pediatric centers are located in the three University Hospitals in Vienna, Graz and Innsbruck and an additional center is located in Linz. Seven of 27 adult centers are in Vienna and all of them perform PTCA as well. In Vienna there are two sites, where emergency coronary bypass operations can be performed, in Linz one heart surgery department covers three centers. Großgmain, Krems and Villach are close to the next cities with surgery departments (Salzburg, St. Pölten and Klagenfurt) and Feldkirch is supported by helicopter. All the other PTCA centers have surgery department in the same house. One cardiac center performs angioplasty of the carotid artery as well.

The four authors and until the year 1995 also J. Mlczoch, instead of F. Leisch, have been visiting all the Austrian centers every year, with no exception. At the beginning of each year the head of each Cath-Lab is asked to invite the monitor of our choice to synchronize his time table with the center.

During the years 1990–1992 in a first attempt of quality control we experienced, that hardly any Austrian Cath-Lab kept a complication book. In the meantime we can rely upon internal quality control in each Cath-Lab, so that

the number of cases and complications within the Cath-Lab is documented in a special book or a database.

Concerning completeness, overall numbers of PTCA, diagnostic procedures, complications, like death and emergency surgery, and numbers of new devices, are documented very carefully. Comparison from year to year by different monitors shows a high confidence in these parameters.

The questionnaire of the European Society is the basis of our Austrian activity. The First Registry Conference, held at the European Heart House in June 26–27th 1997 promoted the minimal basic invasive/interventional data set on the basis of the existing data set of the Working Group Coronary Circulation, published 1996 by Bernhard Meier for the following years [1, 16, 17]. An additional Austrian questionnaire, concerning diagnostic procedures and parameters, concerning the monitor visits, is added [9, 10].

All data and information are treated confidential. We do not publish any numbers or characteristics of a single center. Only pooled data are published and internal revision of the centers is the way to compare pooled data with single center data.

The University Institute for Biostatistics and Documentation in Innsbruck (Head: Prof. Dr. Ing. Karl P. Pfeiffer) conducts all statistical work, beginning with the design of the questionnaire, ending with publication of diagrams via internet.

We ask each center for their opinion concerning our feedback report. Together with our report of results a questionnaire is forwarded to each center, with the possibility to choose different types of feedback communication next year.

Publication policy is a feedback report to each center, concerning the pooled data in comparison to the single center data as fast as possible and pooled data official

publication including the reactions of single centers [4–14]. The primary feedback report has to be in German and the secondary release on the European level has to be in English [19].

Travel expenses for the monitors are refunded by the Austrian Society of Cardiology, all other costs of documentation, statistics and publication are covered by the Innsbruck University or the authors themselves.

Table 1: Cardiac Adult Interventions, European Statistics 1996/97/98, Country Summary (Austria)

Structure of supply	Coronary angiography		PTCA	
	1996/97/98		1996/97/98	
Number of centers	26/26/27		19/20/22	
Number of rooms	31/32/34		24/26/28	
Number of operators	129/144/141		65/85/81	
Centers with surgery	17/16/16		16/16/16	
Centers with database	15/17/17		12/15/15	
Database technician	2/4/4		2/4/4	
Structure of cases	1997 n	(%)	1998 n	(%)
PTCA (cases)	7608		8559	
Multivessel PTCA in one session	743 (9.8 %)		903 (10.6 %)	
PTCA for ongoing infarction	297 (3.9 %)		466 (5.5 %)	
PTCA during diagnostic study (<i>ad hoc</i>)	4661 (61 %)		4798 (70 %)*	
PTCA complication = infarction	67 (0.9 %)		79 (0.9 %)	
Emergency CABG-OP	25 (0.3 %)		13 (0.15 %)	
In-hospital deaths	49 (0.6 %)		43 (0.5 %)	
Stent (cases)	4390 (58 %)		5838 (68 %)	
Multiple stents			1177	
Directional atherectomy	14		20	
Rotablator	290		257	
Laser catheter	10		3	
Coronary angioscopy	0		0	
Ultrasound therapy			24	
Intracoronary ultrasound (diagnostic)	175		413	
Intracoronary doppler	36		130	
Percutaneous left ventricular assist pump	39		25	
Other devices	16		84	
Radial or brachial approach	86		211	
Puncture site closing device	57		260	
Nonionic contrast medium			4393	
Ionic low-osmolar contrast medium			703	
Platelet glycoprotein IIb/IIIa antagonist	519		1235 (14.4 %)	

*) incomplete data

RESULTS

The total number of Austrian centers, laboratories and activities in PTCA and coronary angiography is depicted in Table 1. This table is part of the annual European statistics. There was an increase in the number of PTCA-cases, *ad hoc* PTCA (incomplete data), stenting, diagnostic intracoronary ultrasound, intracoronary doppler, puncture site closing device, radial or brachial approach and use of glycoprotein IIb/IIIa antagonists from 1997 to 1998. There were 43 in-hospital deaths in Austria, due to PTCA in 1998. This is a decrease from 0.6 to 0.5 % compared to 1997. The overall percentage of PTCA for ongoing infarction increased from 3.9 % to 5.5 % from 1997 to 1998.

Concerning the 278 patients without shock, during PTCA for acute MI, mortality was 2.5 %, concerning the 63 patients with

shock, during PTCA for acute MI, mortality was 27.0 % in 1998.

Table 2 shows the Austrian part of the statistical analysis with special reference to coronary angiography, and PTCA, including additional complication parameters. There was an overproportional increase of 21.9 % in left ventricular angiography from 1996 to 1997, whereas right heart catheterization at the time of angiography decreased by 4.2 %. From 1997 to 1998 both decreased by 11.4 % and 29.0 % respectively. The risk of irreversible stroke in PTCA was 0.035 % in 1998 and was 0.04 % in diagnostic angiography in 1997.

Table 3 includes some further parameters, which are part of the European statistics. There was an increase in minimal invasive surgery, electrophysiologic diagnostics and ablations, and implantable defibrillators. Heart transplantation and myocardial biopsy decreased from 1996 to 1997 and increased again from 1997 to

1998. Surgical registries better refer to some of the data [11, 20].

Table 4 shows the comparison of the last years for Austria and Switzerland. Austria shows a constant increase in the case load for angiography, PTCA, stent, and "*ad hoc* PTCA" during a diagnostic study, a fluctuation in frequency of PTCA for acute and ongoing infarction and in the ratio of emergency surgery mortality. But there was a constant decrease in the number of rotational atherectomy, and in the number of emergency bypass surgery due to failed PTCA and in the number of hospital mortality after PTCA. The %-ratio of elective surgery and/or PTCA following diagnostic angiography and the number of complications concerning acute myocardial infarction in the catheterization laboratory are constant from 1997 to 1998. Switzerland shows a steeper increase in the number of PTCA, of "*ad hoc* PTCA" during diagnostic study, of PTCA for acute or ongoing infarction, but no differences in the

Table 2: Austrian Statistics 1998

	Coronary angiography	PTCA
Total number	31,419	8,559
Left ventriculography	19,384	XX
Right heart catheterization	3,415	XX
PTCA during MI without shock		278
Mortality		7
PTCA during MI with shock		63
Mortality		17
Cardiac arrest		56
Myocardial infarction		65
Reversible neurological complications		5
Irreversible neurological complications		3
Peripheral vascular complications		146
– with surgery or transfusion		84

Table 3: Some parameters, which are part of the European statistics and are not directly related to coronary intervention within the Cath-Labs in Austria in 1997/98

	Own data 1997/98	Data of reference [12, 20]
Coronary bypass surgery (cases)	–	3,926 / 3,900
Minimal Invasive Direct Coronary-Artery Bypass (MIDCAB)	44/52	102/–
Heart transplantation	45/49	107/–
Myocardial biopsy	77/135	
Electrophysiologic study with programmed stimulation (diagnostic)	1,148/1,655	
Catheter intervention for arrhythmia (ablation)	838/1,088	
Implantable defibrillator	210/311	
Adult pulmonary valvuloplasty (interventional)	1/1	
Adult mitral valvuloplasty (interventional)	25/19	
Adult aortic valvuloplasty (interventional)	32/6	
Carotis-stent	62	

other parameters compared to Austria [15–18].

There was no problem in keeping the confidence regulations during 1997/1998.

During 1995–1998 frequencies of reported ischaemia, proven to be present before PTCA, and documented exercise stress tests before PTCA are constantly increasing, the number of reported controlling exercise stress tests within 3 months after PTCA does not increase. The distribution of the type of the stenosis to be treated (A, B, C) is shifting to a greater proportion of reported type B and C lesions, at the cost of fewer unreported types and constant rates of type A lesions to be treated (Table 5).

DISCUSSION

The question of additional centers in Austria is still under discussion, and Table 1 as a part of the annual European statistic and Table 2 as the Austrian part of the statistical analysis seem to help Austrian health-care- and -economy-authorities in planning further developments [21].

The mean case load for physicians in Austria performing coronary angiography seems appropriate, but the plateau at approximately 200 cases could be larger. Concerning PTCA the mean case load also is satisfying, but the range between maximum and minimum is very high. The situation for stents, or other new devices is similar to PTCA. It is not surprising, that physicians affirming investigation of case load perform 44 % more angiographies, 62 % more PTCA and

43 % more New Devices compared to the average range. There is a broad but not conclusive opinion on case load and outcome in this context in the international literature [22–26]. So the national discussion also will continue next year.

The coronary angiography case load per center in Austria shows us the possible future development in the direction of a plateau at 1,000 or 1,500 cases per center (table) and year. In this context it would be better in the future to calculate cases per angiography table or room, not per center. The same is true for PTCA. The percentage of PTCA in relation to diagnostic angiography shows, that in general the number of PTCA seems to be dependent more on the number of referred cases than on the number of local “primary” diagnostic angiographies. The percentage of implanted stents is a good example for the chance to observe a devel-

Table 4: Comparison of data of Austria and Switzerland

AUSTRIA (8.05 million inhabitants)	1992	1993	1994	1995	1996	1997	1998
Coronary angiography (CA) per million inhabitants (n)	2351	2721	2637	2996	3296	3726	3927
PTCA per million inhabitants (n)	472	533	617	737	838	951	1070
Ratio of (CABG+PTCA) per CA (%)	36	36	40	41	40	39	39
PTCA during diagnostic CA (%)	39	50	48	50	55	61	70
Ratio of PTCA for ongoing myocardial infarction (%)	1.7	1.8	2.3	2.8	5.1	3.9	5.5
Ratio of hospital mortality after PTCA (%)	0.5	0.5	0.5	0.5	0.6	0.6	0.5
Ratio of myocardial infarction due to PTCA (%)	1.9	1.2	1.4	1.3	1.1	0.9	0.9
Ratio of emergency CABG due to PTCA (%)	0.9	0.7	1.2	0.8	0.4	0.3	0.2
Ratio of stenting in PTCA (%)	2.4	4.3	8.9	27	47	58	68
SWITZERLAND (7.18 million inhabitants)	1992	1993	1994	1995	1996	1997	1998
Coronary angiography (CA) per million inhabitants (n)	2110	2602	3031	3307	3508	3632	4000
PTCA per million inhabitants (n)	462	665	822	959	1102	1241	1366
Ratio of (CABG+PTCA) per CA (%)	48	50	50	48	50	51	48
PTCA during diagnostic CA (%)	43	39	51	59	60	74	77
Ratio of PTCA for ongoing myocardial infarction (%)	3.1	3.3	4.4	6.0	6.1	6.8	8.0
Ratio of hospital mortality after PTCA (%)	1.0	0.6	0.6	0.6	0.7	0.6	0.6
Ratio of myocardial infarction due to PTCA (%)	1.8	1.2	1.2	1.1	1.1	1.2	1.2
Ratio of emergency CABG due to PTCA (%)	1.2	0.8	0.9	0.7	0.4	0.3	0.2
Ratio of stenting in PTCA (%)	3.6	6.0	15	28	50	57	67

Table 5: Parameters for outcome and risk stratification

	Patients/centers (n)			
	1995	1996	1997	1998
Proven ischaemia before PTCA	2729/11	3033/14	3393/14	3644/15
Stress test before PTCA		2451	2752/15	3405/16
Primary success rate after PTCA	3703/14	5163/17	6287/19	6390/18
Stress test 3 months after PTCA	1555/8	1687/9	1932/10	1524/9
Culprit lesion type A (%)		748 (11 %)	797 (11 %)	951 (11 %)
Culprit lesion type B (%)		2292 (34 %)	2752 (37 %)	4021 (47 %)
Culprit lesion type C (%)		1282 (19 %)	1353 (18 %)	2087 (24 %)
Culprit lesion type unknown (%)		2380 (36 %)	2527 (34 %)	1500 (17 %)

opment from linear distribution (from the lowest to the highest case load center) in 1996 to a more plateau profile in 1998, showing how centers – independent of each other – started to develop a more uniform stent-ratio profile in Austria until the year 1998. In the international literature angiography volume and outcome [27, 28], overuse of procedures [29, 30], appropriateness and performance [31–33] are detected as sources for the development of guidelines [34], which is also one of our Austrian main targets.

“Ad hoc PTCA” during diagnostic study seems to occur more frequent from year to year, in Austria and Switzerland, in a range between 50 and 70 % of the PTCA-cases, but it becomes increasing difficult to report these numbers. PTCA for acute or ongoing infarction shows a very inhomogeneous distribution within the last years in Austria, there is no clear trend to be seen, also in the literature there a mainly local reports [35].

Two thirds of the Austrian centers had to perform emergency bypass surgery due to failed PTCA during 1997, and one third during 1998, which is a very interesting observation, interpretation has to be

done very cautious [21]. Fluctuations, concerning PTCA mortality (including emergency surgery mortality) within centers, years and regions, seem dependent on the number of acute and emergency cases, but on the other hand, there is a very constant all-over-mortality in Austria and Switzerland since years, suggesting a kind of “target mortality” of 0.5 %.

There is only one private center in Austria [27]. Possibly related to the higher percentage of private centers in Switzerland [15–18], there is still a steeper increase in the number of PTCA, of “ad hoc PTCA” during diagnostic study and of PTCA for acute or ongoing infarction in Switzerland, suggesting a more aggressive strategy.

APPENDIX: AUSTRIAN CENTERS 1998/99

Klagenfurt, Landeskrankenhaus, Innere Medizin II
 Wien, Universitätsklinik, Kardiologie, Innere Medizin II
 Linz, Krankenhaus der Elisabethinen, Innere Medizin
 Graz, Universitätsklinik, Kardiologie, Innere Medizin
 Graz, Universitätsklinik, Kinderkardiologie

Wien, Krankenhaus der Stadt Wien-Lainz, Kardiologie, Innere Medizin
 Bad Schallerbach, Rehabilitationszentrum
 Graz, Universitätsklinik, Innere Medizin II
 Linz, AKH, Innere Medizin I
 Villach, Innere Medizin
 Wien, Krankenhaus Rudolfstiftung, Innere Medizin
 Feldkirch, Landeskrankenhaus, Innere Medizin
 Wien, Hanusch-Krankenhaus, Innere Medizin
 Wien, Privatklinik Josefstadt, Kardiologie und Innere Medizin
 Großgmain, Rehabilitationszentrum
 Bad Ischl, Rehabilitationszentrum
 Hohegg-Grimmenstein, Rehabilitationszentrum
 Salzburg, Landeskrankenhaus, Innere Medizin
 Wien, Universitätsklinik, Kinderkardiologie
 Wien, Wilhelminenspital, Innere Medizin und Kardiologie
 Linz, Krankenhaus der Barmherzigen Schwestern, Innere Medizin
 St. Radegund, Rehabilitationszentrum
 Eisenstadt, Krankenhaus der Barmherzigen Brüder, Innere Medizin
 Wels, Krankenhaus der Barmherzigen Schwestern, Innere Medizin
 Krems, Krankenhaus der Stadt Krems, Innere Medizin
 St. Pölten, Landeskrankenhaus, Innere Medizin
 Innsbruck, Universitätsklinik, Innere Medizin, Kardiologie
 Innsbruck, Kinderkardiologie
 Wien, Donauspital, Innere Medizin
 Linz, Kinderkardiologie, AKH
 Mistelbach, Krankenhaus, Innere Medizin

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