Natural history of coronary artery disease based on coronary angiography

A critical review

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Coronary angiography has long been recognized as the most accurate means of predicting the natural course of coronary artery disease. Several prerequisites, however, must be fulfilled to make such follow-up studies statistically and clinically acceptable. (1) The number of patients included in the follow-up must be high enough to allow easy statistical handling; 200 cases seem to be a minimum. (2) The follow-up should continue at least 5 years after angiography in order to demonstrate reliably the differences in mortality between the normal population and patients with coronary artery disease, not only in cases of triple-vessel disease, but especially in cases of single- and double-vessel disease. (3) The patients should be as homogeneous as possible, including single-vessel disease, double-vessel disease, and triple-vessel disease in equally representative groups. Hence, the number of patients selected for surgery during the sampling period must be small (preferably below one third of the cases studied) in order not to overweigh unduly the study with respect to the more severe cases with the worst prognosis. Only a few studies fulfill these strict criteria: the studies of Bruschke et al,[1] comprising 590 cases, and Burggraf and Parker,[2] com-

prising 259 patients although incomplete, including only 94% of cases in the third year, 88% in the fourth year, and 73% in the fifth year, and our study in Zurich (Lichtlen-Steinbrunn),[3] comprising 244 patients who underwent coronary angiography between 1966 and 1971. These three studies comprise 1093 cases. They show differences with regard to overall cumulative 5-year survival as well as yearly mortality rates (*Table 1*). The worst prognosis was reported in Bruschke's study where 5-year survival for all patients was 7.3% lower than in Burggraf's study and 9.7% lower than in our patients. Differences are also present with regard to yearly mortality rates, especially in single-vessel disease. This is mainly due to a very low yearly mortality among Burggraf's cases with isolated disease of the right coronary artery and left circumflex coronary artery (*Table 2*). Some differences might be due to selection of patients, along with the increase in surgery during the sampling period in Bruschke's study; this being somewhat reflected in the distribution of patients with regard to the extent of the disease, triple-vessel disease amounting only to 20% in

Table 1. Five-year cumulative survival rates and yearly mortality rates based on 5-year survival in three comparable studies (Bruschke, Burggraf-Parker, Lichtlen-Steinbrunn)

		Five-year cumulative survival rates (%) Number of vessels				Yearly mortality rates (%) Number of vessels			
	N	All	3	2	1	All	3	2	1
Bruschke	590	65.7	46.6	55.6	76.1	6.86 ±2.65	10.68 ±7.15	8.88 ±2.32	4.78 ±1.49
Burggraf	259	73.0	55.0	65.0	92.0	5.40 ±2.79	9.00 ±7.14	7.00 ±2.65	1.60 ±2.00
Lichtlen	244	75.4	54.8	80.4	85.8	4.92 ±2.59	9.00 ±5.12	3.92 ±1.28	2.84 ±2.31
Total	1093	71.4	52.1	67.0	84.6	5.73 ±2.62	9.57 ±6.11	6.60 ±2.90	3.07 ±2.28

Table 2. Five-year cumulative survival rates and yearly mortality rates in single vessel disease

	Five-year cumulative survival rates (%)			Yearly mortality rates (%)		
	LAD	RCA	LCx	LAD	RCA	LCx
Bruschke	77.1	84.7	84.7	4.52	3.06	3.06
(N)	(77)	(105)	(28)	±2.70	±2.64	±3.31
Burggraf	87.0	98.0	100.0	2.60	0.40	0
(N)	(51)	(41)	(9)	±3.286	±0.89	
Lichtlen	80.0	89.6	100.0	4.00	2.80	0
(N)	(37)	(36)	(8)	±1.41	±2.77	
Total	81.4	89.6	94.9	3.71	2.08	–
(N)	(165)	(182)	(45)	±2.54	±2.44	

LAD = Left anterior descending branch.
RCA = Right coronary artery.
LCx = Left circumflex branch.

Bruschke's study, 24.7% inBruggraf's study, and 39.7% in our study. Some might also be due to various indications for angiography. Nevertheless, the differences among the three studies were insignificant.

Due to their degree of completeness, allowing follow-up on an entirely cumulative basis, these three studies probably represent the most accurate figures with regard to 5-year cumulative survival and yearly mortality rates in unoperated patients with coronary artery disease undergoing coronary angiography. Further studies would indeed be desirable to add to our knowledge in this field, especially with regard to single-vessel disease as well as long-term 10-year survival. Due to increasing surgical treatment, in certain centers up to 50% of the patients submitted to angiography, this might no longer be possible.

References

1. Bruschke AV, Proudfit WL, Sones FM Jr: Progress study of 590 consecutive nonsurgical cases of coronary disease followed 5-9 years. I. Arteriographic correlations. Circulation **47:** 1147–1153, 1973.
2. Burggraf GW, Parker JO: Prognosis in coronary artery disease. Angiographic, hemodynamic and clinical factors. Circulation **51:** 146–156, 1975.
3. Lichtlen P, Steinbrunn W: Complete five-year survival rates in 244 unselected, unoperated coronary patients undergoing angiography. (In preparation.)