Natural history of obstructive coronary artery disease

Supplement to a 10-year study

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The results of a 10-year study of the natural history of obstructive coronary artery disease have been reported recently.[1] Because of limitation of space, certain information obtained from the study was not included. The purpose of this supplement is to provide these data.

Methods

The material and methods have been reported in detail.[1] Briefly, all 601 patients who had severely obstructive coronary artery disease demonstrated by arteriography when studied from January 1963 to July 1965 were followed a minimum of 10 years or until death. Patients who had undergone cardiac operations during the first 5 years had been excluded when the original study group was selected.[1] In 1975 the findings at cardiac catheterization were reviewed and patients were classified relative to candidacy for bypass operation by recent criteria without regard to the other coded data. The 388 patients selected as those who would have been candidates for bypass operation if it had been available were studied as a subset of the original group.

Results

Table 1 shows some of the characteristics of 31 patients who had bypass operations subsequent to

Supported in part by a grant from the C. T. Reinberger Foundation.
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Table 1. Dropouts due to operation

No.	Time of operation*	Age, sex	ECG	Angina	Arteries	Ventriculogram	Operative candidate for bypass
1	60	38 M	Normal	CF	Rt	Normal	No
2	60	47 M	Normal	None	Rt	Normal	Complete
3†	68	41 M	MI	3	AD, Cx	Scar	No
4	68	58 F	ST-T	None	AD, Cx, Rt	Normal	Complete
5‡	69	29 M	ST-T	CF	Cx, Rt	Normal	Partial
6†	70	29 M	ST-T	2	Cx	Normal	Complete
7	73	59 M	Normal	3	Rt	Scar	Partial
8	73	52 M	Normal	Atypical	Cx	Normal	Complete
9‡	75	45 M	ST-T	3	AD, Rt	Scar	Partial
10	78	47 M	ST-T	3	AD, Cx	Not done	No
11	80	49 M	ST-T	2	AD, Cx	Scar	No
12	80	43 M	Normal	2	Cx, Rt	Normal	Partial
13	80	43 M	Normal	2	Rt	Normal	Complete
14	84	26 M	Normal	2	AD	Normal	Complete
15	89	48 M	Normal	2	AD, Rt	Normal	Partial
16	90	47 M	Normal	4	Cx, Rt	Normal	Complete
17	94	57 M	ST-T	3	Cx	Normal	Complete
18	95	45 M	MI	RP	Cx	Normal	Complete
19	97	35 M	MI	2	AD	VA	No
20	99	47 M	MI	2	AD	Scar	Partial
21	100	50 M	Normal	1	Rt	Normal	Complete
22	100	45 M	Normal	2	Cx	Scar	No
23	103	33 M	Normal	2	AD, Cx, Rt	Normal	Partial
24	108	44 M	ST-T	4	AD, Rt	VA	Partial
25	108	55 M	Normal	2	AD, Rt	Normal	Complete
26	108	47 M	Normal	2	AD, Rt	VA	Partial
27	109	42 M	ST-T	3	Cx, Rt	Normal	Complete
28	111	57 M	ST-T	3	Lt, AD, Rt	Normal	Complete
29	114	59 M	Normal	2	AD	Normal	Complete
30	116	46 M	MI	Atypical	AD, Cx, Rt	Scar	No
31	118	46 M	Normal	None	Rt	Not done	. . .

Cardiac size normal except enlarged in cases 18 and 19.

* Number of months after catheterization.

† Operative death.

‡ Death due to heart disease at 2 months (No. 5) and 3 months (No. 9).

Abbreviations: CF = coronary failure; Rt = right coronary artery; Complete = candidate for complete revascularization; MI = myocardial infarct; 1, 2, 3, 4 = class of angina; AD = anterior descending artery; Cx = circumflex artery; Scar = localized impairment of contractility; ST-T = abnormalities of repolarization; Partial = candidate for partial revascularization; RP = rest pain; VA = ventricular aneurysm; Lt = left main artery.

selection and the interval between catheterization and operation. These patients were considered dropouts ("withdrawn alive") from a statistical standpoint at the time of operation. Twenty-seven patients were alive at 120 months. The remaining four, all operated on elsewhere, died: two did not survive operation and two died of heart disease 2 and 3 months postoperatively. Fifteen (48%) had single-artery disease at the time of the first catheterization, compared to 29% of the whole group of surgical candidates who had single-artery disease.

Similar data are shown in *Table 2* for

Table 2. Noncoronary deaths

No.	Date of death*	Cause of death	Age, sex	ECG	Angina class	Arteries	Ventriculogram	Operative candidate for bypass
1	4	Suicide	40 M	ST-T	2	Rt	Scar	No
2	11	Cancer	57 M	ST-T	Atypical	Lt, AD, Rt	Diffuse	No
3	11	Hepatitis	59 M	ST-T	4	Rt	Normal	Complete
4	13	ASO	71 M	? MI	2	AD, Cx, Rt	Normal	Partial
5	18	Cancer	55 M	? MI	Atypical	AD, Cx, Rt	Normal	Partial
6	37	Stroke	48 M	ST-T	None	AD	Scar	No
7	49	Stroke	58 F	LVH	Atypical	Rt	Normal	Complete
8	54	Cancer	53 M	IV block	Atypical	Rt	Not done	No
9	55	Stroke	69 M	Normal	Atypical	Rt	Normal	Complete
10	57	Cancer	62 M	ST-T	Atypical	Rt	Normal	Complete
11	64	Cancer	45 F	ST-T	3	AD, Cx, Rt	Scar	Partial
12	65	Cancer	58 M	ST-T	2	AD, Cx, Rt	Not done	Partial
13	67	Cancer	59 F	MI	4	AD, Cx, Rt	Scar	Partial
14	71	Stroke	62 M	LVH	2	Rt	Normal	No
15	72	Stroke	52 M	MI	Atypical	AD	VA	No
16	74	Stroke	62 M	Normal	2	Rt	Normal	Complete
17	79	Cancer	68 F	Normal	Atypical	AD	Not done	No
18	79	Stroke	56 M	MI	None	AD	Scar	No
19	80	Suicide	52 M	MI	Atypical	AD, Cx	Scar	Partial
20	86	Cancer	52 F	Normal	Atypical	Cx	Normal	Complete
21	88	Cancer	60 F	Normal	2	AD, Cx, Rt	Normal	Complete
22	89	Cancer	48 M	Normal	4	Lt, Rt	Normal	Complete
23	90	Stroke	52 M	MI	None	AD, Rt	Scar	No
24	95	Stroke	44 F	IV block	None	Cx, Rt	Diffuse VA	No
25	100	Renal	62 F	Normal	Atypical	Rt	Normal	Complete
26	104	Suicide	41 M	Normal	4	AD, Cx, Rt	Scar	No
27	112	Renal	39 F	Normal	2	Cx, Rt	Normal	Complete
28	112	Suicide	49 M	MI	None	Cx	Normal	Complete
29	112	Stroke	56 M	MI	None	AD, Cx	VA	Partial
30	113	Suicide	48 M	Normal	Atypical	AD, Cx, Rt	Normal	Complete

* Number of months after catheterization.

Abbreviations: ST-T = abnormalities of repolarization; 1, 2, 3, 4 = class of angina; Rt = right coronary artery; Scar = localized impairment of contractility; Lt = left main artery; AD = anterior descending artery; Complete = candidate for complete revascularization; ASO = arteriosclerosis obliterans; MI = myocardial infarction; Cx = circumflex artery; Partial = candidate for partial revascularization; LVH = left ventricular hypertrophy; IV block = intraventricular block; VA = ventricular aneurysm.

patients who died of noncardiac causes and who also are considered dropouts at the time of death in cardiac survival data only. Fifteen of the 30 patients had obstructions of single arteries. Utilization of the data in these tables enables recalculation of cardiac to gross survival in some of the tables and figures of the previous paper.[1]

Interest has centered on the group of patients considered surgical candidates by current criteria. *Table 3* and *Figure 1* show gross survival data for the entire group of 388 surgical candidates and for the 352 who did not have serious obstruction of the left main coronary artery. Because of the small size of the latter group, its removal has little effect on the slope of the curve.

Table 4 and *Figure 2* contain gross survival data on the subsets of surgical candidates who had obstruction of one, two, or three arteries or the left main coronary artery. Comparison with car-

diac survival data shows that only single-artery obstruction is affected significantly by exclusion of noncardiac deaths, 10-year gross survival being 67.7% for gross survival and 73.6% for cardiac survival in this subset.[1]

Discussion

Survival curves usually are expressed in terms of gross survival because often it is difficult to establish a cause of death. Our previous report described cardiac survival only, except for the entire group of 601 patients.[1] The cause of death seemed clearly established in each case except for sudden death, which was considered cardiac. However, for purposes of comparison with other reports, gross survival would be useful. Only 5%

Table 3. Survival of surgical candidates

Year	Whole group (388), %	Excluding left main artery (352), %
1	91.8	92.9
2	88.5	86.1
3	79.1	80.7
4	74.7	76.1
5	70.1	71.6
6	65.1	66.4
7	61.4	62.6
8	56.0	57.6
9	53.5	55.4
10	47.9	50.3

Table 4. Survival of surgical candidates; subsets

Year	One artery (111), %	Two arteries (149), %	Three arteries (92), %	Left main (36), %
1	98.2	92.0	88.0	80.6
2	97.3	83.2	77.2	69.4
3	96.4	76.5	68.5	63.9
4	94.6	72.5	59.8	61.1
5	88.3	68.5	56.5	55.6
6	81.7	67.8	45.6	52.8
7	79.3	62.3	43.3	50.0
8	73.8	59.0	36.7	41.7
9	70.3	57.6	34.8	36.1
10	67.7	51.4	29.2	25.7

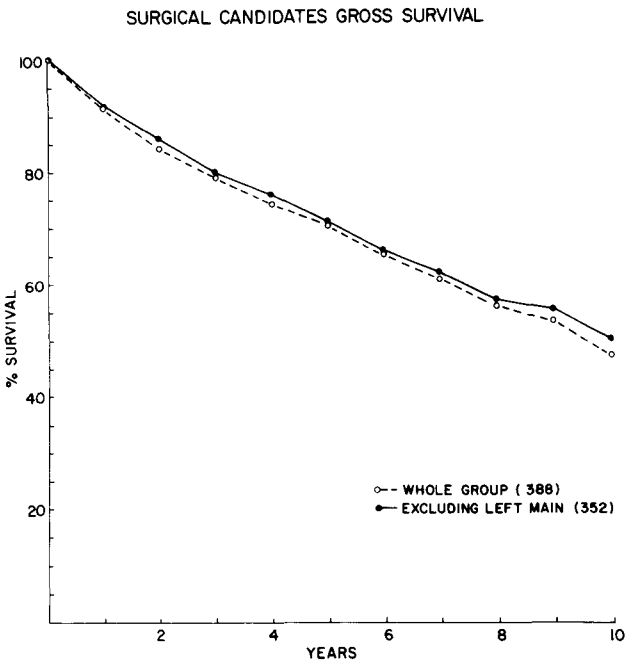

Fig. 1. Gross survival in the whole group of surgical candidates and the subset excluding left main artery lesions.

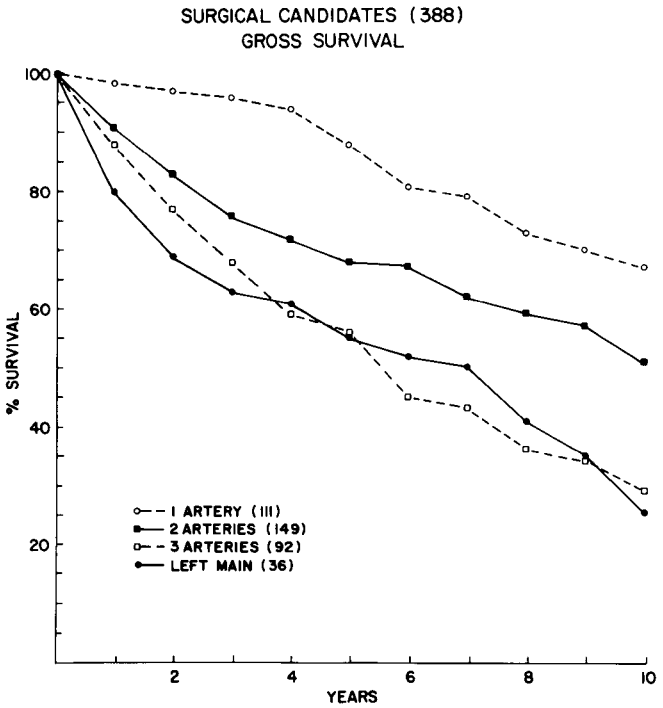

Fig. 2. Survival in surgical candidates by arteries involved.

of patients (30) died of noncardiac causes during the entire 10-year period, and 1.7% (10) died during the first 5 years. This low mortality must reflect selection for catheterization of patients who were considered to be in good general health except for coronary disease, hypertension, or diabetes. The low incidence of noncardiac death affects the survival curve only slightly at 5 years and modestly at 10.

A high percentage of surgical candidates in both the group that had subsequent operation and the noncoronary-death group had obstructions of single arteries. Most of the deaths occurred between the sixth and tenth years, a period to which patients who have single-artery disease are more likely to survive than those who have more extensive disease. Data of subsequent catheterization are available for almost all patients who had operations, and progressive disease was characteristic of the group in which obstructions of single arteries had been demonstrated originally.

Use of a composite survival curve is of little value in clinical medicine because "average" patients are not encountered. More meaningful analysis is possible by selection of curves drawn for specific arterial involvement. The recent development of bypass surgery has stimulated interest in the prognosis of patients who would have been candidates for bypass operation by current criteria. The data reported previously showed cardiac survival and the present study indicates gross survival of such patients. The small numbers of noncardiac deaths in this group were responsible for the fact that differences between cardiac and gross survival were small.

Summary

Data are presented on the gross survival of candidates for bypass operation as a supplement to the cardiac survival information reported previously.[1] Some of the characteristics of patients who had cardiac operations during the period of study and those who died of noncardiac causes are discussed. Only minor differences in gross and cardiac survival were found.

Acknowledgment

The authors gratefully acknowledge the work of Anne B. Lipscomb and Gloria Newton in the follow-up of patients and F. David Gill in computer programming.

Reference

1. Proudfit WL, Bruschke AVG, Sones FM Jr: Natural history of obstructive coronary artery disease: ten-year study of 601 nonsurgical cases. Prog Cardiovasc Dis **21:** 53–78, 1978.