

# Perioperative myocardial infarction after coronary bypass surgery

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Perioperative myocardial infarction, a complication of coronary artery surgery, is an important clinical consideration because of its possible effects on long-term results.<sup>1-4</sup> Variability from 5% to 40% in the reported frequency of perioperative myocardial infarction<sup>4</sup> can be attributed to criteria for recognition of the event, technical factors, and differences in populations studied.

Electrocardiographic and enzyme data suitable for analyses were available for 1151 of 1638 patients having coronary artery bypass surgery without scar excision operated upon between 1970 and 1975. We analyzed these data to determine whether the frequency of perioperative myocardial infarction has changed and to assess the clinical outcome after hospitalization of comparable patients with and without perioperative myocardial infarction. The incidence of perioperative myocardial infarction was assessed using 12-lead electrocardiograms obtained preoperatively, on the day of operation and on the first, second, third, and seventh days after surgery. On the basis of persistent S-T segment elevation, Q wave changes and serum glutamic oxaloacetic transaminase (SGOT) greater than 100 IU/liter, we separated the

surgical patients into groups according to their probability for perioperative myocardial infarction.

in the number of patients with multivessel disease undergoing operation. Newer surgical techniques, improved

Perioperative myocardial infarction group	SGOT (IU/liter)	Electrocardiogram
Negative	100	Not considered
Questionable	100	Negative or nonspecific changes
Positive		
a. Probable	100	Persistent localized S-T segment elevation
b. Definite	100	New Q waves

Using these criteria, we observed a decline in the incidence of the combined categories, definite and probable myocardial infarction, from 10%-14% in 1970-1972 to 2%-4% for 1974-1975. Preliminary data from 1976 show the perioperative myocardial infarction rate has remained at the same level for 1974-1975. The change is unlikely to be due to population differences. This reduction has occurred despite an increase in the mean number of grafts inserted and

anesthesiology, and myocardial preservation techniques, initiated for the most part in 1973, may be responsible for the decreased incidence of perioperative myocardial infarction. The pertinent clinical characteristics of the patients in these three groups are summarized in the *Table*.

Long-term follow-up revealed no significant relationship between the relief of angina at 6 months postoperatively and the occurrence of perioperative myocardial infarction.

**Table.** Characteristics of coronary bypass surgery patients by perioperative myocardial infarction group

Number of patients	Perioperative myocardial infarction group		
	Negative	Questionable	Positive
Mean	783	302	66
Age (yr)	52.9	51.9	53.0
Diastolic blood pressure (mm Hg)	78.2	79.5	80.8
Duration of C-P bypass (min)	67.9	82.7	79.8
Duration of follow-up (mo)	28.0	35.2	37.1
Percent			
Men	85	89	88
Previous myocardial infarction (ECG)	34	39	25
Congestive heart failure	34	27	30
Number vessels diseased			
One	11	8	9
Two	32	29	39
Three	56	63	52
Vessels bypassed			
One	14	13	13
Two	41	42	56
Three or more	46	45	31

Subsequent myocardial infarction after surgery was approximately three times greater in those with questionable perioperative myocardial infarction and almost nine-fold greater for those with positive perioperative myocardial infarction compared to the negative group. Finally, the group of patients with perioperative myocardial infarction exhibiting both enzyme elevations and electrocardiographic evidence of sustained subepicardial injury or of infarction demonstrated the highest subsequent mortality at all points in time. At 2 years after surgery the survival rates were 97%, 94%, and 87% respectively for the negative, questionable, and positive perioperative myocardial infarction groups.

Contrary to opinions of some, perioperative myocardial infarction appeared to have little influence on relief of angina after surgery. Perioperative myocardial infarction adversely influenced the clinical course

of this group of patients with regard to both infarction and death during the period of follow-up after surgery. Further attention toward reducing this complication of saphenous vein bypass grafting is likely to result in an improved prognosis for patients treated surgically.

## References

1. Brewer DL, Bilbro RH, Bartel AG: Myocardial infarction as a complication of coronary bypass surgery. *Circulation* **47**: 58-64, 1973.
2. Schrank JP, Slabaugh TK, Beckwith JR: The incidence and clinical significance of ECG-VCG changes of myocardial infarction following aortocoronary saphenous vein bypass surgery. *Am Heart J* **87**: 46-54, 1974.
3. Guiney TE, Rubenstein JJ, Sanders CA, et al: Functional evaluation of coronary bypass surgery by exercise testing and oxygen consumption. *Circulation* **48** (Suppl III): 141-145, 1972.
4. Mundth ED, Austen WG: Surgical measures for coronary heart disease. *N Engl J Med* **293**: 75-80, 1975.