Attitudes About Treatment of Coronary Heart Disease Among Women and Men Presenting for Exercise Testing

John Z. Ayanian, MD, MPP, Arnold M. Epstein, MD, MA

To assess attitudes that could contribute to gender differences in the use of coronary procedures, we surveyed 322 patients presenting for exercise testing at a major teaching hospital. Adjusting for sociodemographic and clinical factors, women and men did not differ significantly in their willingness to seek a second opinion, reduce physical activity, or take drugs to avoid major cardiac surgery, but men were more likely than women to describe themselves as risk takers on a three-item personality measure (adjusted odds ratio 2.5; 95% confidence interval 1.4-4.6). Patients' attitudes about risk should be explored further in studies of gender differences in the use of coronary procedures.

KEY WORDS: gender (sex); attitude to health; exercise test; coronary angiography; coronary artery bypass.

J GEN INTERN MED 1997;12:311-314.

Numerous studies have demonstrated differences in the use of major procedures for women and men.¹⁻¹² Bias in the medical system¹³ and unmeasured clinical factors¹⁴ have been cited as possible explanations for these differences. Although patients' attitudes are often important factors in medical decision making,¹⁵⁻¹⁸ little attention has been devoted to these attitudes as potential mediators of gender differences in invasive treatments.¹⁹ We surveyed patients presenting for exercise testing at a major teaching hospital to assess attitudes that might be associated with angiography use, including beliefs about risk, willingness to take drugs or reduce physical activity, and desire for second opinions.

Received from the Division of General Medicine (Section on Health Services and Policy Research), Department of Medicine, Brigham and Women's Hospital and the Department of Health Care Policy, Harvard Medical School, Boston, Mass. (JZA, AME); and the Department of Health Policy and Management, Harvard School of Public Health, Boston, Mass. (AME).

Presented at the 18th annual meeting of the Society of General Internal Medicine, San Diego, Calif., May 1995.

Supported in part by the John D. and Catherine T. MacArthur Foundation Research Network on Successful Midlife Development. Dr. Ayanian is a Generalist Physician Faculty Scholar of the Robert Wood Johnson Foundation.

Address correspondence and reprint requests to Dr. Ayanian: Department of Health Care Policy, Harvard Medical School, 25 Shattuck St., Parcel B, 1st Floor, Boston, MA 02115.

METHODS

Hospitalized and ambulatory patients presenting for exercise testing at Brigham and Women's Hospital during July and August 1993 were eligible for the study. The survey, available in English and Spanish, was completed by subjects before or immediately after exercise testing, prior to discussing test results with their physicians. It assessed willingness to reduce activity or take drugs to avoid major heart surgery, desire for second opinions before major surgery, and three attitudes about risk taking adapted from the Jackson Personality Inventory (Appendix A).²⁰ Other questions addressed sociodemographic characteristics, overall health, cardiovascular diagnoses and risk factors, past coronary procedures, and cardiac functional status.²¹

Data on age, gender, cardiac drug use, and results of exercise testing were obtained from exercise test reports. Subsequent performance of coronary angiography within 90 days was determined from the hospital's computer system. Because referring physicians worked full-time at this hospital or at a staff-model health maintenance organization that directs patients to this hospital for major cardiac procedures, almost all angiography within 90 days would have been performed at this hospital.

We compared sociodemographic and clinical variables and attitudes by gender using the χ^2 test, Fisher's Exact Test, or Student's *t* test as appropriate. We used logistic regression to assess whether attitudes differ by gender, adjusting for age, race, Hispanic ethnicity, education, income, marital status, living alone, history of myocardial infarction and angina, Specific Activity Scale class, and previous coronary procedures. We also analyzed the use of coronary angiography by attitudes, using logistic regression to adjust for gender, age, exercise test results, and history of myocardial infarction.

With a 5% α error, these analyses had 80% power to detect differences of 15% (60% vs 75%) in the proportions of women and men reporting a specific attitude or 10% (5% vs 15%) in the proportions of persons with differing attitudes undergoing angiography; power to detect smaller differences in use of angiography was limited. Two-tailed *p* values or adjusted odds ratios (ORs) with 95% confidence intervals (CIs) are reported for all results.

RESULTS

Of the 407 eligible patients, 322 (79.1%) completed the written survey, including 135 (77.6%) of 174 women

and 187 (80.3%) of 233 men ($p = .51$). Respondents and nonrespondents did not differ significantly in age, use of β blockers or nitrates, results of exercise testing, or subsequent rates of coronary angiography, angioplasty, or bypass surgery (all $p > .15$).

Among survey respondents (Table 1), larger proportions of women than men were black, Hispanic, unmarried, living alone, poor, and less educated. Women were less likely than men to report diagnoses of angina or myocardial infarction and previous coronary procedures. However, women reported greater limitations on the Specific

Activity Scale and a greater effect of cardiac symptoms on their daily life than men.

Among women and men, respectively, exercise tests were positive in 7.4% and 11.8%, equivocal in 20.7% and 19.8%, and negative in 71.9% and 68.5% ($p = .43$). Women and men had similar rates of coronary angiography within 90 days after positive (40.0% vs 31.8%, $p = .70$), equivocal (14.3% vs 8.1%, $p = .45$), and negative exercise tests (2.1% vs 6.3%, $p = .19$), and the overall rates of angiography were comparable as well (7.4% vs 9.6%, $p = .49$).

In unadjusted analyses (Table 2), significantly more

Table 1. Sociodemographic and Clinical Characteristics of Survey Respondents Presenting for Exercise Testing by Gender

Characteristic	Women* (n = 135)	Men* (n = 187)	p Value
Mean age, years	58.0	56.2	.24
Black race	25.8 (34/132)	11.5 (21/182)	.001
Hispanic ethnicity	11.7 (13/111)	1.8 (3/163)	.001
College graduate	26.0 (34/131)	40.5 (75/185)	.007
Married	44.4 (59/133)	77.4 (144/186)	<.001
Living alone	27.8 (37/133)	13.0 (24/184)	.001
Uninsured	7.3 (9/123)	3.4 (6/178)	.12
Annual family income <\$12,000	30.6 (33/108)	10.7 (16/150)	<.001
General health			
Poor	5.6 (7/125)	7.1 (13/182)	
Fair	28.0 (35/125)	22.0 (40/182)	
Good	48.0 (60/125)	44.0 (80/182)	.41
Very good	14.4 (18/125)	20.3 (37/182)	
Excellent	4.0 (5/125)	6.6 (12/182)	
Cardiac risk factors			
Hypertension	50.0 (66/132)	47.3 (86/182)	.63
Hypercholesterolemia	28.8 (36/125)	27.1 (48/177)	.75
Diabetes mellitus	17.5 (22/126)	11.4 (20/175)	.14
Current smoker	14.8 (20/135)	12.4 (23/186)	.53
Family history of myocardial infarction	57.5 (73/127)	49.2 (88/179)	.15
Previous cardiac diagnoses			
Angina	36.8 (46/125)	52.5 (94/179)	.007
Myocardial infarction	19.9 (26/131)	43.4 (79/182)	<.001
Cardiac drugs			
β blockers	31.9 (43/135)	52.4 (98/187)	<.001
Calcium channel blockers	30.4 (41/135)	34.8 (65/187)	.41
Nitrates	19.3 (26/135)	32.6 (61/187)	.008
Aspirin	45.9 (62/135)	66.3 (124/187)	<.001
Previous coronary procedures			
Angiography	23.9 (31/130)	44.6 (83/186)	<.001
Angioplasty	12.4 (12/97)	27.7 (38/137)	.005
Bypass surgery	12.0 (16/133)	21.6 (40/185)	.03
Specific Activity Scale†			
Class IV	10.8 (14/130)	11.1 (20/180)	
Class III	23.8 (31/130)	6.1 (11/180)	
Class II	20.0 (26/130)	16.1 (29/180)	<.001
Class I	45.4 (59/130)	66.7 (120/180)	
Heart symptoms effect on daily life			
A lot	6.8 (9/132)	8.2 (15/182)	
Some	32.6 (43/132)	19.2 (35/182)	
A little	33.3 (44/132)	30.8 (56/182)	.02
None	27.3 (36/132)	41.8 (76/182)	

* Columns represent percentages (except for age). Absolute numbers of patients with nonmissing data are noted in parentheses.

† Ranges from no functional limitation (class I) to chest pain with dressing (class IV).²¹

Table 2. Unadjusted and Adjusted Relative Odds of Patient Attitudes by Gender

Attitude	Unadjusted Male:Female OR (95% CI)	Adjusted* Male:Female OR (95% CI)
Willing to take risks in general†	2.2 (1.3–3.6)	2.5 (1.4–4.6)
Would <i>definitely</i> reduce physical activity to avoid major heart surgery	0.6 (0.4–1.0)	0.7 (0.4–1.3)
Would <i>definitely</i> seek second opinion if doctor recommended major surgery	0.6 (0.4–1.0)	0.7 (0.4–1.3)
Would <i>definitely</i> take 3 drugs to avoid major heart surgery	1.1 (0.7–1.7)	0.9 (0.5–1.6)

*Adjusted for age; race; Hispanic ethnicity; education; income; marital status; living alone; history of myocardial infarction and angina; Specific Activity Scale class; and previous coronary angiography, angioplasty, and bypass surgery.

†From three-item personality measure.²⁰

men then women described themselves as risk takers on the three-item personality measure (40.8% vs 24.0%, $p = .002$), and this measure had acceptable internal consistency (Cronbach coefficient $\alpha = .73$). Fewer men than women would definitely reduce their physical activity to avoid major heart surgery (33.5% vs 43.8%, $p = .07$) or seek a second opinion before major surgery (59.9% vs 70.7%, $p = .05$). Similar proportions of men and women were definitely willing to take three drugs to avoid major heart surgery (64.3% vs 62.7%, $p = .76$). After adjusting for sociodemographic and clinical variables (Table 2), only the difference in risk attitudes was significant ($p = .003$).

In adjusted analyses, a definite willingness to take drugs to avoid major heart surgery was of borderline significance ($p = .09$) as a negative predictor of angiography (OR 0.5; 95% CI 0.2–1.1). The adjusted odds of coronary angiography did not differ significantly for patients who described themselves as risk takers (OR 1.4; 95% CI 0.6–3.6), would definitely reduce their physical activity (OR 0.8; 95% CI 0.3–2.1), or would definitely seek a second opinion before major surgery (OR 0.7; 95% CI 0.3–1.7) relative to other patients.

DISCUSSION

Important differences in the use of major coronary procedures for women and men are well documented, yet the sources of these differences have not been defined. To our knowledge, this study is the first report to assess attitudes of women and men that could contribute to sex differences in the use of major coronary procedures. Although men and women did not differ in adjusted analyses of several attitudes in our cohort, men presenting for exercise testing were significantly more likely than women to describe themselves as risk takers. Therefore, gender differences in attitudes about risk taking should be explored in future studies with larger numbers of subjects, particularly to assess with greater power the relation of risk attitudes to procedure use.

Strengths of this study include detailed sociodemographic and clinical data and a survey response rate of nearly 80% without evidence of response bias. This study

also has limitations. We surveyed patients at a single teaching hospital, and the sample size provided limited power to detect differences in the use of coronary angiography. The study questions were designed for a self-administered patient survey, and they could be evaluated in other settings. The richness of this subject would also support more extensive questioning of patients' and physicians' views about symptoms and key treatment decisions—both before and after exercise testing. Such assessments have the potential to enhance our understanding of variations in care between women and men.

We are grateful to Paul D. Cleary, PhD, and L. Howard Hartley, MD, for advice about the design of this study, Rajani Narasimhan LaRocca for assistance with data collection, Loraine Scampini for assistance with statistical programming, and Anthony L. Komaroff, MD, and Barbara J. McNeil, MD, PhD, for comments on an earlier draft of the manuscript.

REFERENCES

1. Tobin JN, Wassertheil-Smoller S, Wexler JP, et al. Sex bias in considering coronary bypass surgery. *Ann Intern Med.* 1987;107:19–25.
2. Khan SS, Nessim S, Gray R, Czer LS, Chaux A, Matloff J. Increased mortality of women in coronary artery bypass surgery: evidence for referral bias. *Ann Intern Med.* 1990;112:561–7.
3. Ayanian JZ, Epstein AM. Differences in the use of procedures between women and men hospitalized for coronary heart disease. *N Engl J Med.* 1991;325:221–5.
4. Steingart RM, Packer M, Hamm P, et al. Sex differences in the management of coronary artery disease. *N Engl J Med.* 1991;325:226–30.
5. Shaw LJ, Miller DD, Romeis JC, Kargl D, Younis LT, Chaitman BR. Gender differences in the noninvasive evaluation and management of patients with suspected coronary artery disease. *Ann Intern Med.* 1994;120:559–66.
6. D'Hoore W, Sicotte C, Tilquin C. Sex bias in the management of coronary artery disease in Quebec. *Am J Public Health.* 1994;84:1013–5.
7. Petticrew M, McKee M, Jones J. Coronary artery surgery: are women discriminated against? *BMJ.* 1993;306:1164–6.
8. Kee F, Gaffney B, Currie S, O'Reilly D. Access to coronary catheterisation: fair shares for all? *BMJ.* 1993;307:1305–7.
9. Kjellstrand CM. Age, sex, and race inequality in renal transplantation. *Arch Intern Med.* 1988;148:1305–9.

10. Soucie JM, Neylan JF, McClellan W. Race and sex differences in the identification of candidates for renal transplantation. *Am J Kidney Dis.* 1992;19:414-9.
11. Gaylin DS, Held PJ, Port FK, et al. The impact of comorbid and sociodemographic factors on access to renal transplantation. *JAMA.* 1993;269:603-8.
12. Katz JN, Wright EA, Guadagnoli E, Liang MH, Karlson EW, Cleary PD. Differences between men and women undergoing major orthopedic surgery for degenerative arthritis. *Arthritis Rheum.* 1994;37:687-94.
13. Healy B. The Yentl syndrome. *N Engl J Med.* 1991;325:274-6.
14. Mark DB, Shaw LK, DeLong ER, Califf RM, Pryor DB. Absence of sex bias in the referral of patients for cardiac catheterization. *N Engl J Med.* 1994;330:1101-6.
15. McNeil BJ, Weichselbaum R, Pauker SG. Fallacy of the five-year survival in lung cancer. *N Engl J Med.* 1978;299:1397-1401.
16. Brody DS. The patient's role in clinical decision-making. *Ann Intern Med.* 1980;93:718-22.
17. Eraker SA, Politser P. How decisions are reached: physician and patient. *Ann Intern Med.* 1982;97:262-8.
18. Nease RF, Kneeland T, O'Connor GT, et al. Variation in patient utilities for outcomes of the management of chronic stable angina. Implications for clinical practice guidelines. *JAMA.* 1995;273:1185-90.
19. Schecter AD, Goldschmidt-Clermont PJ, McKee G, et al. Influence of gender, race, and education on patient preferences and receipt of cardiac catheterization among coronary care unit patients. *Am J Cardiol.* 1996;78:996-1001.
20. Jackson DN. *Jackson Personality Inventory Manual.* Goshen, NY: Research Psychologists Press; 1975.
21. Goldman L, Hashimoto B, Cook EF, Loscalzo A. Comparative reproducibility and validity of systems for assessing cardiovascular functional class: advantages of a new Specific Activity Scale. *Circulation.* 1981;64:1227-34.

APPENDIX A

Survey Items Measuring Attitudes

Three items measuring attitudes about surgery were designed for this study; potential responses were "definitely," "probably," "probably not," "definitely not," and "not sure":

- ◆ Would you take 3 medications every day for the rest of your life if it would help you to avoid a major heart operation, such as coronary bypass surgery?
- ◆ Would you significantly reduce the physical effort in your daily activities if it would help you to avoid a major heart operation, such as coronary bypass surgery?
- ◆ If your doctor recommended a major operation, would you seek a second opinion from another doctor?

Three risk attitudes from the Jackson Personality Inventory²⁰ were also included; potential responses were "agree strongly," "agree somewhat," "disagree somewhat," "disagree strongly," and "not sure":

- ◆ Taking risks does not bother me if the gains involved are high.
- ◆ I enjoy taking risks.
- ◆ People have told me that I seem to enjoy taking chances.