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DIFFERENCES IN MITRAL VALVE DISEASE PRESENTATION AND SURGICAL TREATMENT OUTCOME BETWEEN HISPANIC AND NON-HISPANIC PATIENTS

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Objectives: This study analyzed the differences in clinical presentation, etiology, and hospital outcome between Hispanic and non-Hispanic patients who underwent surgical correction of mitral valve disease at a large urban medical center.

Design: All adult patients undergoing isolated mitral valve repair or replacement surgery at two hospitals between 1993 and 2003 were studied. Patients were grouped according to ethnicity as reported to the New York State Cardiac Surgery Reporting System. Preoperative variables compared included age, congestive heart failure (CHF), etiology, and pertinent medical and surgical histories, while perioperative variables included type of operation, mortality, and hospital complications.

Results: A total of 1683 patients (135 Hispanic,1548 non-Hispanic) underwent mitral valve surgery. Hispanic patients were younger (48.3±16.0 vs 59.7±15.9 years, $P<.001$) and had higher incidences of CHF (48.9% vs 35.3%, $P=.002$), endocarditis (8.9% vs 5.0%, $P=.05$), and rheumatic disease (12.6% vs 5.4%, $P<.001$). Non-Hispanic patients had a higher incidence of degenerative disease (68.0% vs 54.8%, $P<.01$). No differences in hospital mortality (Hispanic 5.9% vs 5.3%, $P=.76$) or perioperative complications were observed between the two groups, although Hispanic patients were less likely to undergo mitral valve repair than mitral valve replacement (35.6% vs 61.2%, $P<.001$).

Conclusions: In the urban population studied, Hispanic patients presented for mitral valve surgery at a younger age and with a higher prevalence of CHF and rheumatic disease. Public health strategies to prevent rheumatic fever among Hispanics are needed, and improved screening might facilitate earlier referral for Hispanic patients, increasing the potential for benefitting from mitral valve repair. (*Ethn Dis*. 2008;18:306–310)

Key Words: Heart Valve, Mitral Valve, Hispanic

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INTRODUCTION

The Hispanic population in the United States is increasing rapidly. Hispanics account for one of every two people added to the United States population through immigration and birth and constitute the largest ethnic minority. At the same time the volume of mitral valve surgery has increased as indications have expanded and outcomes have improved, as demonstrated by both the New York State adult cardiac surgery database and the Society for Thoracic Surgery national cardiac database. Despite these facts, little if anything has been published concerning mitral valve disease, its surgical treatment options (valve repair or replacement), and outcomes in Hispanics compared with non-Hispanics.

Some studies on the controversial subject of the "Hispanic health paradox" have shown that while Hispanics have far greater socioeconomic risk factors than do non-Hispanic Whites, in California Hispanics had markedly lower mortality from heart disease, cancers, and stroke and longer life expectancy.[1] This was despite the fact that Hispanics are more likely than non-Hispanics to lack health insurance coverage.[2] In addition, although Hispanics have been reported to have a higher prevalence of cardiovascular disease risk factors than non-Hispanic Whites, some studies have reported lower cardiovascular disease and coronary heart disease mortality.[3] However, other studies have failed to confirm the existence of the Hispanic health paradox.[4]

We hypothesized that patients of Hispanic ethnicity present at a younger age but a later stage in their mitral disease than do non-Hispanic patients and that this factor affects outcomes.

Hispanic ethnicity affected whether or not patients in New York State underwent coronary artery bypass grafting (CABG) after an acute myocardial infarction.[5] In another study comparing Hispanics with White non-Hispanics suffering acute MI, Hispanics were younger and more likely to survive coronary revascularization.[6] Hispanic patients who underwent percutaneous coronary intervention were younger and had a higher incidence of hypertension and diabetes than did non-Hispanic

Whites.[7] In another study, Hispanics had slower progression of coronary calcium than did other ethnic groups.[8] With regard to mitral valve disease, one study of 2439 persons >60 years of age found no significant differences in the association of mitral annular calcium with prior stroke between Hispanics and non-Hispanic Whites.[9]

Repairing the mitral valve is generally acknowledged to be preferable to replacing it.[10] Reported advantages of mitral repair include improved hospital and long-term mortality, preservation of left ventricular function, avoidance of the need for long-term anticoagulation, decreased thromboembolic complications, lower risk of endocarditis, and long-term freedom from reoperation.[11–20] The presenting stage of mitral valve disease, however, significantly influences the possibility of repairing the valve, affecting both outcomes and the need for lifelong anticoagulation. Early referral for significant mitral valve disease greatly increases the possibility of valve repair rather than replacement.

The purpose of this study was to perform a retrospective review to evaluate the presenting conditions of patients with mitral valve disease to our cardiothoracic surgical service, the surgical choices, and their outcomes. We hypothesized that patients of Hispanic ethnicity present at a younger age but a later stage in their mitral disease than do non-Hispanic patients and that this factor affects outcomes.

METHODS

Data were routinely prospectively collected in accordance with the requirements of the New York State Cardiac Surgery Reporting System, an audited database containing information on all patients who have undergone surgery on the heart or great vessels in New York State. The data collected included information on demographics, operation, risk factors, complications, and discharge status. All patients ≥18 years of age who underwent isolated mitral valve replacement or repair between 1993 and 2003 at New York University Medical Center or Bellevue Hospital Center were included in this study. The same group of surgeons performed all mitral operations at both hospitals. Exclusion criteria were repeat mitral valve replacement, concomitant CABG, surgery on another valve, and aortic surgery. Ethnicity/race was as determined by the patient or patient's family, in accordance with the definition of ethnicity/race used by the Society for Thoracic Surgery National Database. Mitral valve disease etiology was determined from clinical and pathological records. This study was approved by the institutional review board with a waiver of individual consent

Data were analyzed by using SPSS software (version 13; SPSS, Chicago, Ill). Continuous variables are expressed as the mean plus or minus standard deviation. Comparisons of continuous variables between groups were performed with the Student *t* test or nonparametric tests. Categorical variables were compared between groups with the χ^2 or Fisher exact test. Statistical significance was set at $P \leq .05$ for all analyses.

RESULTS

Between January 1993 and December 2003, a total of 1683 Hispanic and non-Hispanic patients were discharged after undergoing first-time, isolated mitral valve replacement or repair at New York University Medical Center or Bellevue Hospital Center. The same group of surgeons operated on patients at both hospitals. With respect to ethnicity, 135 (8.0%) Hispanic and 1548 (92.0%) non-Hispanic patients were discharged. The preoperative characteristics and risk factors for Hispanic patients were similar to those of non-Hispanic patients in most respects (Table 1). A significantly higher percentage of Hispanic patients were female (63.7% vs. 43.3%, $P<.001$). The Euroscores for both groups were equivalent (Hispanics 6.39±3.64 vs. non-Hispanics 6.30±3.77; $P=.77$). Hispanics had significantly lower height (160.5±21.8 vs. 168.8±13.1 cm; $P<.001$) and weight (67.0±19.5 vs. 71.6±16.4 kg; $P<.001$). However, Hispanic patients had significantly worse cardiac function as measured by ejection fraction than did non-Hispanics, and a greater percentage of Hispanics were in Canadian Cardiovascular Classification functional class 3 or 4 than were non-Hispanics.

Among Hispanics 77.7% had no-to-moderate mitral stenosis, and 23.2% had severe mitral stenosis, compared with 87.7% no-to-moderate mitral stenosis and 12.3% severe mitral stenosis among non-Hispanics ($P<.005$). Also, a significantly higher percentage of Hispanics than non-Hispanics had current congestive heart failure (CHF) and had smoked within the year before surgery. Hispanics had a significantly higher incidence of rheumatic etiology for their mitral disease (Table 2). A difference between Hispanics and non-Hispanics in preoperative active endocarditis (8.9% vs. 5.0%) was of borderline significance ($P=.051$). In contrast, non-Hispanics had a significantly higher incidence of degenerative mitral disease.

The most striking finding, however, was that Hispanics came to mitral valve surgery at a significantly younger age than non-Hispanics (Table 1). Hispanics were significantly less likely to undergo mitral valve repair than were non-Hispanics (35.6% repair, 64.4% replacement vs 61.2% repair, 38.8% replacement; $P<.001$). Of patients with rheumatic mitral disease, a greater percentage of Hispanic patients underwent repair than did non-Hispanic patients (Table 3). In contrast, non-Hispanic patients with degenerative disease were more likely to have repair than were Hispanic patients with degenerative disease. Similarly, non-His-

Table 1. Preoperative characteristics of 1683 Hispanic and non-Hispanic patients who underwent mitral valve surgery at two hospitals in New York, 1993–2003

Preoperative Characteristic	Hispanic*	Non-Hispanic*	*P* Value
No. patients	135	1548	
Height (cm)	160.5±21.8	168.8±13.1	<.001
Weight (kg)	67.0±19.5	71.6±16.4	.002
Body surface area (m^2)	1.72±0.32	1.82±0.25	<.001
% female	63.7 (86)	43.3 (671)	<.001
Age (years)	48.3±16.0	59.7±15.9	<.001
Ejection fraction (%)	39.7±23.6	45.1±20.8	.015
CCS class 3 or 4	60.9 (82)	51.7 (800)	.037
Euroscore	6.39±3.64	6.30±3.77	.777
1 previous open-heart surgery	25.2 (34)	18.9 (292)	.075
2 previous open-heart surgeries	5.2 (7)	4.5 (69)	.696
≥3 previous open-heart surgeries	2.2 (3)	1.0 (16)	.210
MI in last 24 hours	0	0	
Previous transmural MI	4.4 (6)	8.5 (131)	.102
>1 previous MI	0.7 (1)	2.6 (41)	.173
Previous stroke	11.9 (16)	7.5 (116)	.071
Carotid/cerebrovascular disease	2.2 (3)	2.8 (43)	.704
Aortoiliac disease	2.2 (3)	2.9 (45)	.647
Femoral/popliteal disease	3.0 (4)	3.3 (51)	.835
Shock	1.5 (2)	1.0 (16)	.628
Hypertension	39.3 (53)	46.7 (723)	.096
Current CHF	48.9 (66)	35.3 (546)	.002
Past CHF	40.7 (55)	39.1 (605)	.705
COPD	14.1 (19)	12.8 (195)	.621
Calcific aortic atherosclerosis	4.4 (6)	8.5 (132)	.097
Active endocarditis	8.9 (12)	5.0 (77)	.051
Diabetes	9.6 (13)	8.1 (125)	.528
Hepatic failure	.7 (1)	.6 (9)	.817
Renal failure	5.2 (7)	3.2 (50)	.228
Smoked within past year	7.4 (10)	2.5 (39)	.001
Cardiomegaly	43.7% (59)	38.2% (591)	.206

CCS = Canadian Cardiovascular Society Functional System, MI = myocardial infarction, CHF = congestive heart failure, COPD = chronic obstructive pulmonary disease.
* All values are given as mean ± standard deviation or % (*n*).

panics with endocarditis had a higher likelihood of repair.

Despite the increased incidence of some risk factors among Hispanics, no significant difference was observed between Hispanics and non-Hispanics in hospital mortality (Table 4). This finding was also true for patients <65 years of age (Hispanic 2.8% vs non-Hispanic 2.5%, *P*=.88) and those 65 or older (Hispanic 18.5% vs. non-Hispanics 8.8%, *P*=.09). In addition, Hispanics did not differ significantly from non-Hispanics in the incidence of most postoperative complications, including stroke, myocardial infarction, deep sternal infection, reoperation for bleeding, reoperation for second bypass, heart block or pacemaker requirement, sepsis or endocarditis, gastrointestinal complications, renal failure, cardiac arrest, postcardiotomy shock requiring mechanical support, or respiratory failure.

DISCUSSION

The most striking of our findings on mitral valve surgery in Hispanic patients was that they present for mitral valve surgery at a significantly younger age than do non-Hispanics (48.3 years vs 59.7 years). In addition, a significantly higher percentage of Hispanic patients are women and have higher incidences of preoperative smoking, current CHF, and active endocarditis. However, we observed no significant difference in

Table 2. Etiology of mitral valve disease for Hispanic and non-Hispanic patients who underwent mitral valve surgery at two hospitals in New York, 1993–2003

Etiology	Hispanic % (*n*)	Non-Hispanic % (*n*)	*P* value
Rheumatic	12.6 (17)	5.4 (84)	<.001
Degenerative	54.8 (74)	68.0 (1053)	<.01
Ischemic	1.5 (2)	1.9 (29)	
Infection	5.2 (7)	4.6% (72)	
Congenital	0	1.2 (18)	
Other	13.4 (18)	9.4 (146)	
Unknown	12.6 (17)	9.4 (146)	

Table 3. Incidence of mitral valve repair (MVP) by etiology for Hispanic and non-Hispanic patients who underwent mitral valve surgery at two hospitals in New York, 1993–2003

	HISPANICS		NON-HISPANICS		
Etiology	**Total**	**MVP % (*n*)**	**Total**	**MVP% (*n*)**	***P* value**
Rheumatic	17	88.2 (15)	84	63.1 (53)	<.05
Degenerative	74	20.3 (15)	1053	63.7 (671)	<.001
Ischemic	2	100 (2)	29	82.8 (24)	
Endocarditis	7	0	72	34.7 (25)	>.05
Congenital	0	0	18	94.4 (17)	
Other	18	5.6 (1)	146	11.6 (17)	

hospital mortality between Hispanics and non-Hispanics (5.9% vs 5.3%) or in major morbidities. The present results show that when Hispanic patients with mitral valve disease have access to the same quality hospitals and surgeons as do non-Hispanics, Hispanic patients have similar hospital mortality and complication rates despite a higher incidence of certain risk factors. These findings lend some indirect support to the Hispanic health paradox.

The results of this study also show, however, that mitral valve repair was not performed as commonly in Hispanics (35.6%) as in non-Hispanics (61.2%, $P<.001$). This finding might have significant long-term implications because patients who undergo mitral valve replacement have a worse prognosis. Surprisingly, the lower rate of valve repair in Hispanics was not due to a higher incidence of rheumatic disease. Although Hispanics had a higher incidence of rheumatic disease (12.6% vs 5.4%), those with rheumatic mitral valve disease had a greater likelihood of having their valves repaired than did non-Hispanics (88.2% vs 63.1%). Degenerative mitral valve disease in Hispanics was less likely to be repaired than in non-Hispanics (20.3% vs 63.7%), accounting for the lower overall repair rate. In addition, endocarditis was less likely to be repaired in Hispanics (0% vs 34.7%). If the lower likelihood of repair for degenerative mitral valve disease in Hispanics is due to more advanced disease, encouraging earlier referral might improve the ability of surgeons to repair the valve. Whether presentation at a significantly earlier age in Hispanics is a result of failures in primary care or a result of an innate enhanced susceptibility to the process of

Hispanics were overall less likely than non-Hispanics to undergo mitral valvuloplasty, a fact that might have an effect on long-term outcome.

Table 4. Hospital mortality and complications among Hispanics and non-Hispanics who underwent mitral valve surgery at two hospitals in New York, 1993–2003

	Hispanics % (*n*)	**Non-Hispanics % (*n*)**	***P* value**
Hospital mortality	5.9 (8)	5.3 (82)	.75
Stroke within 24 hours	1.5 (2)	1.6 (25)	.91
Stroke beyond 24 hours	0	1.8 (28)	.12
All stroke	1.5 (2)	3.4 (53)	.25
Transmural MI	0	.2 (3)	.61
Non-transmural MI	0	.3 (4)	.55
Deep sternal infection	0	.6 (10)	.35
2nd operation for bleeding	1.5 (2)	2.8 (44)	.35
Returned to OR for 2nd CPB surgery	0	.2 (3)	.61
Heart block/pacemaker	.7 (1)	1.0 (16)	.74
Sepsis/endocarditis	1.5 (2)	2.9 (45)	.34
GI bleed, perforation, or infarct	0	1.6 (24)	.14
Renal failure	3.0 (4)	3.0 (46)	.99
Cardiac arrest	0	.7 (11)	.33
Mechanical support postsurgery	0	.1 (1)	.77
Respiratory failure	5.2 (7)	8.0 (124)	.24

MI = myocardial infarction, CBP = cardiopulmonary bypass, GI = gastrointestinal.

mitral disease and co-morbidities remains to be determined.

Limitations

This was a retrospective study based on medical records. Although the percentage of Hispanic patients in this study (8.0%) is relatively small, it exceeds the percentage of Hispanic patients (5.6%) among all patients undergoing CABG in New York State from 1997 through 2000.[21] However, the Hispanic population in New York City might not be representative of the entire Hispanic population in the United States. The relatively small numbers precluded the use of stratification or propensity case-matching techniques. Furthermore, the power of the test might not have been sufficient to demonstrate the statistical significance of the differences in mortality and the incidence of risk factors and complications between the two groups.

Conclusions

The present findings suggest that Hispanics present for mitral valve surgery at a significantly younger age than do non-Hispanics and with higher incidences of CHF, endocarditis, and rheumatic heart disease. Degenerative mitral valve disease is more common in non-Hispanics. Hispanics were overall less likely than non-Hispanics to undergo mitral valvuloplasty, a fact that might have an effect on long-term outcome. This difference was due primarily to a lower likelihood of repair for Hispanic patients with degenerative mitral disease and endocarditis. Improved screening in this ethnic group might facilitate earlier referral, which could increase the potential for mitral valvuloplasty.

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