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strategy results in a significantly lower rate of cardiovascular death and MI. These findings were driven primarily by a reduction in MI. The clinical implication of these findings is that by identifying patients with significant myocardial ischemia and by incorporating the latest PCI technology, including current generation DES, a significant reduction in so-called hard endpoints can be achieved. This is in addition to the significant reduction in acute coronary syndromes and urgent revascularization and the significant improvement in angina and quality of life with PCI as compared with MT alone in patients with CCS.

One potential criticism of this meta-analysis is the exclusion of older randomized trials, such as the COURAGE (Clinical Outcomes Using Revascularization and Aggressive Drug Evaluation) trial (4) and the BARI-2D (Bypass Angioplasty Revascularization 2 Diabetes) trial (5). However, both trials began enrolment roughly 20 years ago including patients with minimal or no myocardial ischemia and before several advances in medical and PCI management of CCS patients occurred.

A limitation of this study is the lack of complete patient-level data. This was partially addressed by the extraction of the time-to-event data from the ISCHEMIA trial. Another limitation of this study is the fact that 21% of the patients randomized to revascularization in the ISCHEMIA trial underwent coronary artery bypass grafting, which may lead to a reduction in spontaneous MI compared with PCI, although it approximately two-thirds of the procedural MI in ISCHEMIA occurred in the coronary artery bypass graft patients. Finally, the ISCHEMIA trial was much larger than FAME 2.

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

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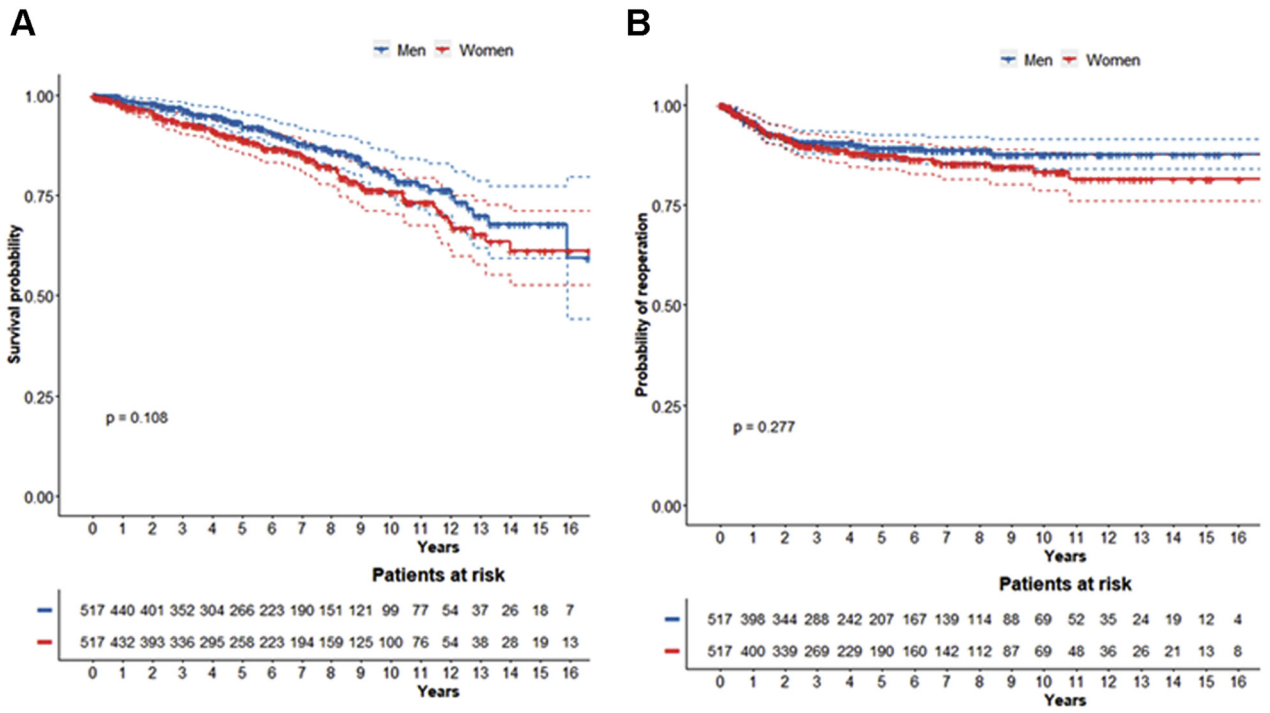
RESEARCH CORRESPONDENCE

Sex-Related Differences in Outcomes of Alcohol Septal Ablation for Hypertrophic Obstructive Cardiomyopathy

Data on sex differences in the outcomes of alcohol septal ablation (ASA) for symptomatic patients with hypertrophic obstructive cardiomyopathy (HOCM) are limited (1). Therefore, we collected data from a multinational European registry (the Euro-ASA Registry) (2) to assess the sex-related short- and mid-term outcomes of patients with HOCM treated with ASA.

The study was approved by a Motol multicenter ethics committee. A total of 1,632 patients with symptomatic HOCM who underwent ASA between 1997 and 2019 were included. Compared with men, women were older (62.1 ± 14 years vs. 53.5 ± 13 years; $p < 0.01$), had higher left ventricular (LV) gradients (75 ± 40 mm Hg vs. 66 ± 37 mm Hg; $p < 0.01$), had lower septal wall thickness (20.5 mm vs. 20.9 mm; $p = 0.04$), and were more likely to be in New York

FIGURE 1 Kaplan-Meier Survival Curves



Kaplan-Meier survival curves with 95% confidence intervals for freedom from all-cause mortality ($p = 0.11$) **(A)** and for freedom from repeat septal reduction procedures ($p = 0.28$) **(B)** in the matched women versus men.

Heart Association functional class III or IV (87% vs. 71%; $p < 0.01$). In contrast, men had larger mean left atrial diameters (45.9 ± 7 mm vs. 48.1 ± 7 mm; $p < 0.01$) and LV end-diastolic diameters (41.4 ± 6 mm vs. 44.9 ± 6 mm; $p < 0.01$). LV ejection fraction was similar in both groups (70 ± 10% vs. 70 ± 9%; $p = 0.41$).

Propensity score matching between sex groups was applied, which yielded 517 women matched with 517 men. In the matched cohort, the alcohol volume injected at ASA was 2.2 ± 0.9 ml in women and 2.3 ± 0.9 ml in men ($p = 0.05$). In the 30-day adjusted analysis, 3 women (0.6%) and 1 man (0.2%) died ($p = 0.62$), and 47 women (9.1%) and 52 men (10.1%) underwent permanent pacemaker implantation ($p = 0.67$).

None of the patients were lost to follow-up; the mean follow-up duration was 5.5 ± 4.5 years. ASA led to similar percentage LV outflow gradient reductions in both the unadjusted (72 ± 32% in women vs. 73 ± 30% in men; $p = 0.55$) and matched (73 ± 30% vs. 75 ± 28%; $p = 0.78$) groups; similar final LV outflow gradient was present in both unadjusted (17 ± 20 mm Hg vs. 15 ± 21 mm Hg; $p = 0.06$) and matched (17 ± 21 mm Hg vs. 15 ± 22 mm Hg; $p = 0.12$) groups. New York Heart Association functional class at last clinical control was worse in women (unadjusted groups: 1.8 ± 0.7 vs. 1.6 ± 0.7 [$p < 0.01$]; matched groups: 1.8 ± 0.6 vs. 1.6 ± 0.6 [$p < 0.01$]).

There was no difference in an appropriate implantable cardioverter-defibrillator discharge for ventricular tachycardia or ventricular fibrillation in the matched groups (1.7% in women vs. 2.0% in men; $p = 0.71$), successful resuscitation (1.7% in women vs. 2% in men; $p = 1.00$), or sudden cardiovascular death (2.7% in women vs. 2.5% in men; $p = 0.86$).

Ten-year freedom from all-cause mortality in women versus men was 68% (95% confidence interval [CI]: 63% to 73%) versus 83% (95% CI: 79% to 87%) ($p < 0.01$). In the adjusted analysis, 10-year freedom from all-cause mortality in women versus men was 76% (95% CI: 70% to 81%) versus 80% (95% CI: 75% to 86%) ($p = 0.11$) (Figure 1A). A total of 181 patients (11%; 11% women vs. 12% men) underwent 205 repeated septal reduction procedures for insufficient symptomatic relief and persistence of significant LV

outflow gradient (p = 0.28 in adjusted analysis) (**Figure 1B**).

Most studies of patients with HOCM have consistent findings regarding different phenotypes in female and male patients; that is, women are diagnosed and treated later than men and have worse clinical and echocardiographic profiles (3). Recently, Geske et al. (4) demonstrated that women with hypertrophic cardiomyopathy were more symptomatic at presentation and had worse long-term survival. Despite these findings, after adjustment for baseline prognostic factors, there was no survival difference after septal myectomy for HOCM by sex in a recent Mayo Clinic investigation (5).

In this large multicenter registry of patients undergoing ASA for HOCM (the Euro-ASA Registry), women presented at an older age and with worse LV obstruction and dyspnea. However, after propensity score matching, both men and women had comparable outcomes following ASA both at 30 days and during mid-term follow-up. With regard to sex-related differences, these results are consistent with the outcomes of patients after myectomy (2).

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