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ORIGINAL INVESTIGATIONS

2213 Lesion Complexity and Outcomes of Extended Dual Antiplatelet Therapy After Percutaneous Coronary Intervention
R.W. Yeh, L. Mauri, et al.
■ EDITORIAL Patient Complexity Is More Important Than Lesion Complexity
A. Colombo, F. Giannini

2226 Stable High-Sensitivity Cardiac Troponin T Levels and Outcomes in Patients With Chest Pain
A. Roos, M.J. Holzmann, et al.
■ EDITORIAL Time for a New Strategy
M.P. Bonaca

2240 Cardiac Effects of Highly Active Antiretroviral Therapy in Perinatally HIV-Infected Children: The CHAART-2 Study
S.E. Lipshultz, S.D. Colan, et al.
■ EDITORIAL HAART for Kids' Hearts
J.W. Rossano, K.Y. Lin

2250 Temporary Circulatory Support in U.S. Children Awaiting Heart Transplantation
V.V. Yarlagadda, C.S. Almond, et al.
■ EDITORIAL Rise of the Machines
J. Conway, S.J. Bozso

2264 Phenotype and Clinical Outcomes of Titin Cardiomyopathy
U. Tayal, S.A. Cook, et al.
■ EDITORIAL Should TTNtv Identification Change Management?
C. Newton-Cheh

THE PRESENT AND FUTURE

2278 REVIEW TOPIC OF THE WEEK Interleukin-1 Beta as a Target for Atherosclerosis Therapy: Biological Basis of CANTOS and Beyond
P. Libby

2290 COUNCIL PERSPECTIVES Status of Early-Career Academic Cardiology: A Global Perspective
C.W. Tong, A.M. Freeman, et al.

LEADERSHIP PAGE

2304 Cardiology Takes the Hill!
M.N. Walsh

2308 LETTERS

Audio summaries from Dr. Valentin Fuster, JACC Editor-in-Chief.

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TABLE 1 Patient Details Specific to History of SCAD and Subsequent Chest Pain Symptoms

Patient #	Age*, yrs	SCAD Risk Factors	Initial SCAD Management	Timing of Symptoms	% of Cycles Affected	Evaluation of Recurrent CP	Treatment
1	35	5 days PP	PCI	5 days pre-menstrual	100	PCI to residual dissection; persistent pain without ischemia on subsequent stress test	Short-acting nitrate prn
2	42	Prior SCAD	Unsuccessful PCI; CABG	1–2 days pre-menstrual	5–10	No ischemia on stress test	Short-acting nitrate prn, CCB
3	39	13 days PP, FMD	Unsuccessful conservative;† PCI	1–2 days pre-menstrual	90	Patent coronary arteries on CA	Short-acting nitrate prn, CCB, beta-blocker
4	46	None	Conservative	1–2 days pre-menstrual	100	Improved coronary artery caliber on CA	Long-acting nitrate, ranolazine, endometrial ablation
5	44	None	Conservative	1–2 days pre-menstrual through menses	100 for 2 yrs, now 5–10	No ischemia on stress test; stable CCTA	Short-acting nitrate prn
6	34	FMD	Unsuccessful conservative; PCI	1–2 days pre-menstrual through menses	50	Complex PCI for in-stent stenosis; intracoronary thrombus requiring emergent CABG; persistent pain without ischemia on stress test; patent stents/grafts on repeat CA	Ranolazine, CCB, beta-blockers, long-acting nitrate
7	45	EDS type IV	Unsuccessful conservative; unsuccessful PCI; interval CABG	1–2 days pre-menstrual during first 2 days of menses	100	Patent coronary arteries on CCTA	Short-acting nitrate prn, CCB, long-acting nitrate
8	43	Emotional stress	Conservative	3 days pre-menstrual during first 2 days of menses	100	No ischemia on stress test; patent coronaries on CA	Short-acting nitrate prn
9	37	10 weeks PP	PCI	1–2 days pre-menstrual	Only heavy cycles	No ischemia on stress test	Short-acting nitrate prn
10	37	15 days PP	CABG	1–2 days pre-menstrual	50	No ischemia on stress test	Short-acting nitrate prn, long-acting nitrate, ranolazine
11	41	None	Conservative	1–2 days pre-menstrual	20	No ischemia on stress test	Short-acting nitrates prn, CCB

*Age in years at the time of SCAD. †Conservative = conservative management during which the patient received medications but no other invasive treatment strategies at time of SCAD.

CA = coronary angiography; CABG = coronary artery bypass grafting; CCB = calcium-channel blocker; CCTA = coronary computed tomography angiography; CP = chest pain; EDS = Ehlers-Danlos syndrome; FMD = fibromuscular dysplasia; PCI = percutaneous coronary intervention; PP = postpartum; prn = pro re nata (when necessary); SCAD = spontaneous coronary artery dissection.

The novel observation of catamenial chest pain among SCAD patients emphasizes the potential vascular significance of ovarian hormones among these patients. If catamenial chest pain is recognized, and after excluding ongoing ischemia/infarction, anti-ischemic therapies can be titrated to achieve optimal symptom control. The role of pregnancy, endogenous/exogenous hormones, endometrial ablation, and menopause in SCAD needs to be further explored to better discern management of post-SCAD contraception, pregnancy considerations, and recurrent symptoms.

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Recovery of Left Atrial Contractile Function After Maze Surgery in Persistent Longstanding Atrial Fibrillation

Atrial fibrillation (AF), the commonest dysrhythmia, affects nearly 4.5 million people in Europe and

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JACC VOL. 70, NO. 18, 2017
OCTOBER 31, 2017:2308–13

2.2 million in the United States. Prevalence increases with age (4% at age >60 years and 9% at age >80 years), and its effect on quality of life and health resources is considerable. Fibrillating atria have no contractile function. The most serious complication is thromboembolic stroke (12,500 strokes are attributed to AF annually in the United Kingdom). To reduce thromboembolism, patients are anticoagulated, which increases bleeding risk. AF also exacerbates heart failure and is a rising public health burden as the population ages.

The maze procedure creates lesions in the atria to obstruct the macro-re-entry circuits essential to sustain AF. Maze is most commonly performed as an adjunct to major cardiac surgery and significantly increases 12-month freedom from AF, restoring sinus rhythm (SR) in 44% to 94% of treated patients compared with 5% to 33% of control subjects (1). Restoring SR does not guarantee return of atrial contractile function, and both thromboembolism and heart failure exacerbation are related to the loss of contractile function (2).

Studies of atrial transport after maze are limited by small samples, selection bias, and lack of matched control subjects. The HESTER (Has Electrical Sinus Translated into Effective Remodelling?) matched cohort study compared atrial transport in patients whose SR was restored by maze with those in SR before and after cardiac surgery. Maze patients were in SR at least 1 year after receiving maze for persistent longstanding AF as an adjunct to cardiac surgery. Control patients were in SR before and at least 1 year after cardiac surgery, matched 1-to-1 for time since procedure (±6 months), age (±5 years), sex, type of surgery, left ventricular function, and risk profile (logistic EuroSCORE). The aim was to assess whether the 2 cohorts had equivalent left atrial (LA) function, primarily active left atrial ejection fraction (ALAEF):

$$ALAEF = 100 \times \frac{LAV_{preA} - LAV_{min}}{LAV_{preA}}$$

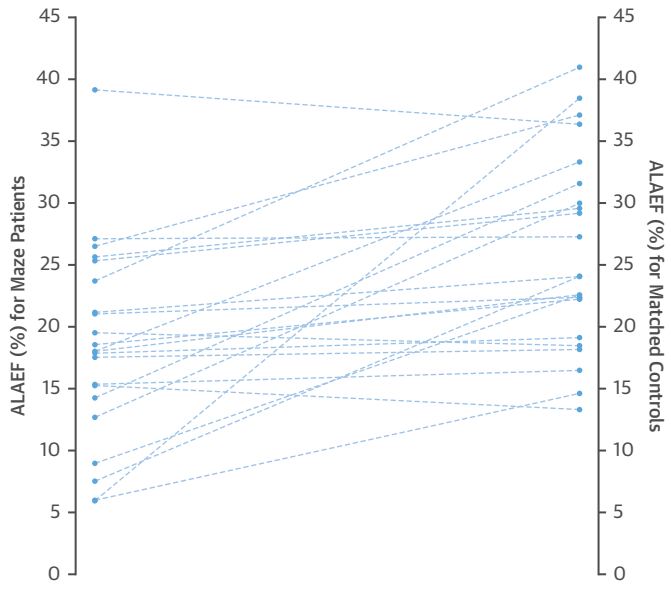
where LAVpreA = pre-A wave left atrial volume and LAVmin = minimum left atrial volume. Secondary outcomes were LA volume measurements, active and passive stroke volume, and LA ejection fraction.

LA function was evaluated by transthoracic echocardiography and multislice cardiac magnetic resonance imaging. For each modality, a single operator blinded to patient identity performed the test and interpreted the findings. A mixed effects linear regression model was fitted, including treatment and matching variables (fixed effects) and matched pairs (random effects). An unconstrained covariance model was assumed. The estimated treatment coefficient was taken as the mean ALAEF difference. In normal subjects in SR, mean ALAEF was 43 ± 18.2% (3), which could be taken as the minimum clinically important difference in ALAEF.

Between 2013 and 2015, 22 pairs were recruited and had LA functional measurements. Maze patients had lower mean ALAEF (18.4%) than control subjects (26%). One-to-one comparison shows that control subjects had higher ALAEF in all but 3 pairs (**Figure 1**). After adjusting for the paired design and matching variables, mean ALAEF was 8.03% lower in maze than control subjects (95% confidence interval: −12.43% to −3.62%; p = 0.0015).

Patients with chronic AF may have persistent LA dysfunction even after restoration of SR by ablation. Buber et al. (2) reported that absence of LA contraction, despite SR restoration, is associated with a significant increase in the risk of thromboembolic stroke after maze. Global and regional atrial dysfunction may be the result of a combination of injury from the ablation process and pre-existing disease (2). The 2 adverse features of asymptomatic AF, thromboembolism and effect on cardiac function, are both directly related to atrial function. Restoring SR without restoring function is unlikely to be of clinical benefit. The HESTER study provides evidence that function is indeed restored after adjunct maze, with potential clinical benefits in reducing

FIGURE 1 ALAEF Measurements for Individual Patients Undergoing the Maze Procedure and Their Matched Control Subjects



ALAEF = active left atrial ejection fraction.

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thromboembolic and heart failure risk. Determining whether patients can safely stop taking anticoagulants after SR is restored by a maze procedure requires long-term follow-up and stroke surveillance beyond the HESTER study. The varying rates of LA functional recovery after maze means that it would be prudent to measure atrial function before considering anticoagulation withdrawal.

In summary, a return to SR after adjunct maze is associated with recovery of LA function but with a mean ALAEF smaller in maze patients than in control subjects. This functional recovery and the variability observed within it may have important implications for survival, heart function, and clinical decisions on long-term anticoagulation.

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Deferred Stenting in STEMI

Still an Interest in Selected Patients?

Deferred stenting (DS) in the setting of ST-segment elevation myocardial infarction (STEMI) has been the subject of numerous controversies, but the current view is that DS should be restricted to very selected cases, as demonstrated once again by Lønborg et al. (1). Notwithstanding, it is widely acknowledged that thrombus plays a key role in the pathophysiology of STEMI, and the size and composition of thrombus may affect the results of primary percutaneous coronary intervention, given the risk of distal embolization. The ratio of plaque to thrombus is highly variable among culprit lesions; it is also highly variable with time, and this represents the conceptual basis of the DS strategy. Despite the overall negative results of this study in terms of microvascular obstruction (1), we think that there is still a place for a "tailored DS strategy," provided that thrombus-laden lesions can be selected. In this respect, Lønborg et al. (1) showed a highly significant interaction between DS and lesion length that may represent an interesting parameter for selection of patients who are potentially eligible for DS.

This finding is perfectly in line with our observation that, in patients with STEMI who are treated with DS, the longer the culprit lesion, the greater is its shortening with time (2). In particular, for lesions longer than 23.7 mm (very close to the 24-mm cutoff reported by Lønborg et al. [1]), this shortening could reach more than 7 mm (2). Within such a brief time frame, this result clearly implies that the length of the lesion is associated with thrombus content. The paper by Loøborg et al. (1) strongly fuels the hypothesis of a prognostic advantage of DS in the presence of a long lesion, probably through thrombus regression. Although it is a post hoc analysis with all the inherent limitations of such a study, we find this result extremely promising for tailoring the best strategy during primary percutaneous coronary intervention. However, we acknowledge that routine DS in all patients with STEMI is probably not an option. We believe that further adequately designed clinical trials that have an evaluation of thrombotic load and lesion length as their basis should be encouraged.

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