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SPONTANEOUS CORONARY ARTERY DISSECTION

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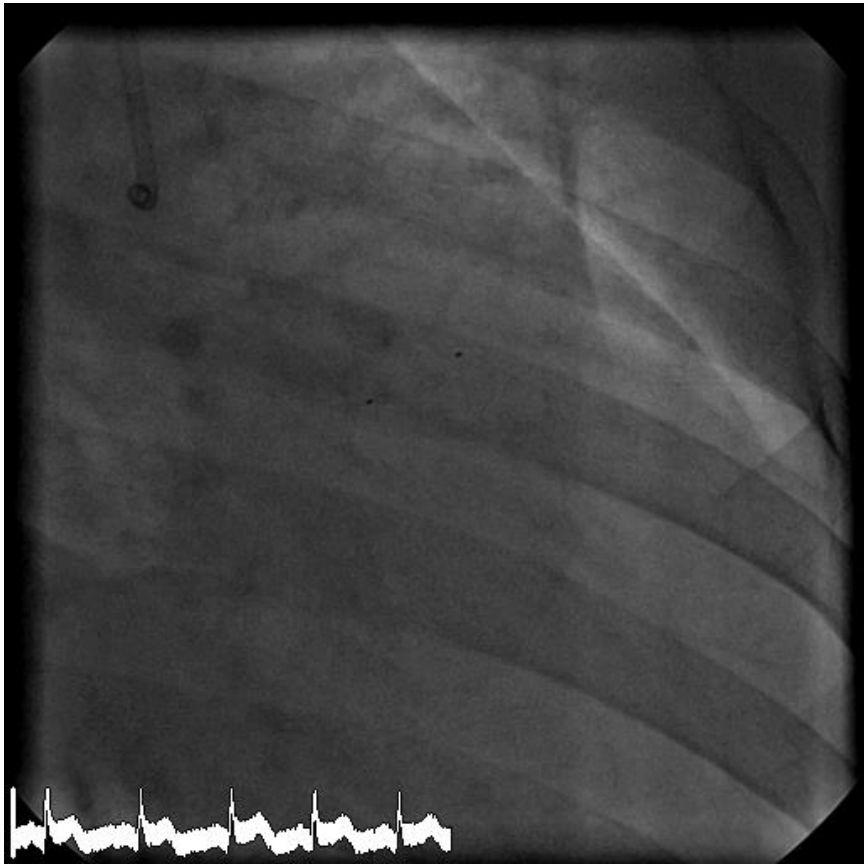
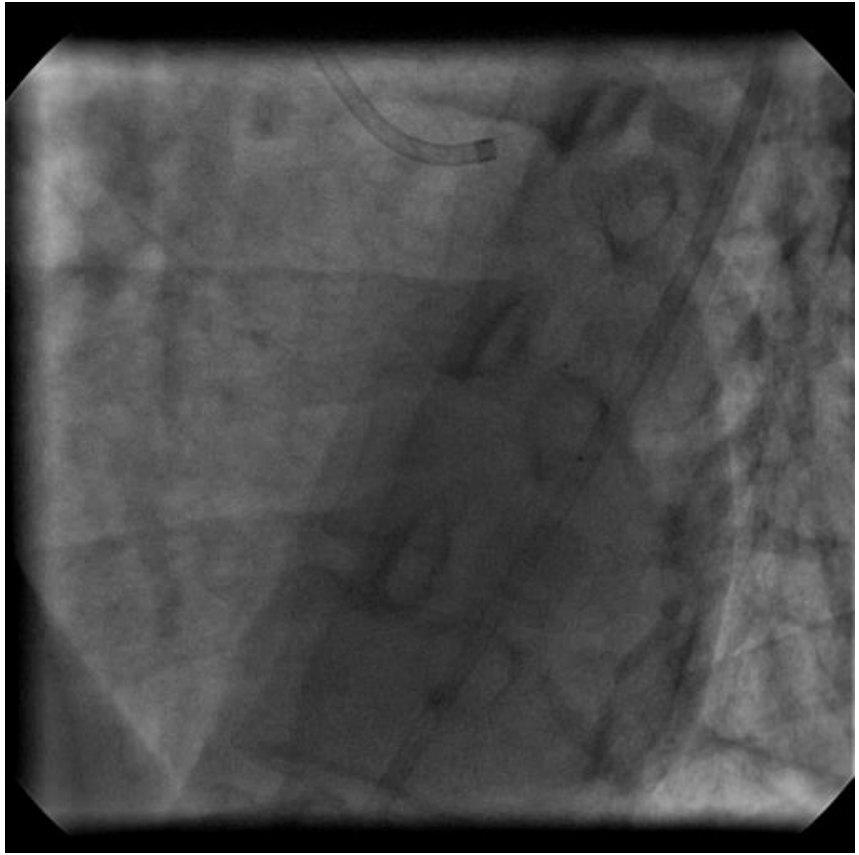
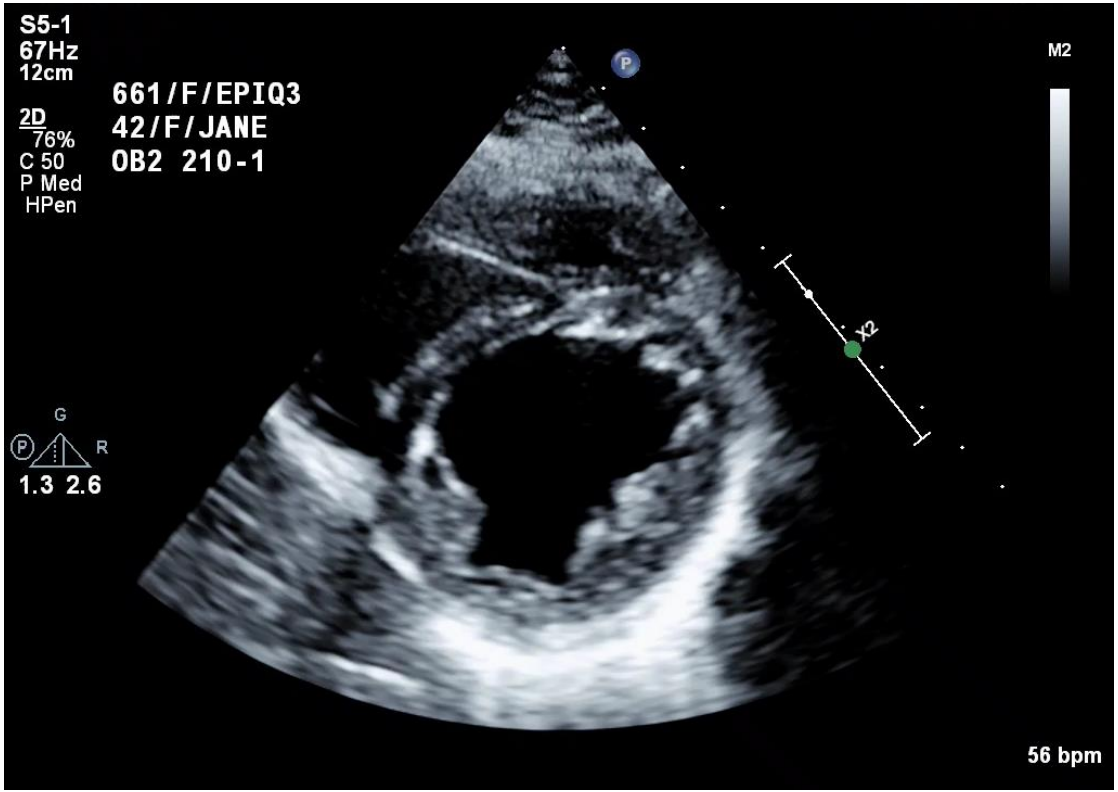
Disclosures: None

- 35 year old female with no risk factors
- NSTEMI





- 7 years later: referred by OBGYN
- Pregnant 6 weeks
- No chest pain and euvolemic
- Echo: Unchanged (preserved LV systolic function)


S5-1
67Hz
12cm
661/F/EPIQ3
42/F/JANE
OB2 210-1
2D
76%
C 50
P Med
HPen
M2
X2
G
R
1.3 2.6
56 bpm

DEFINITION

- **Spontaneous coronary artery dissection (SCAD): a spontaneous tear in the coronary arterial wall that is not traumatic or iatrogenic**
  - Contemporary terminology is confined to nonatherosclerotic causes
  - **U**nderdiagnosed for decades, but with an increased clinical index of suspicion & greater use of intracoronary imaging (OCT & IVUS) diagnosis of SCAD improved.

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Spontaneous Coronary Artery Dissection

Clinical Outcomes and Risk of Recurrence

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PATIENT PROFILES

TABLE 1 Baseline Characteristics

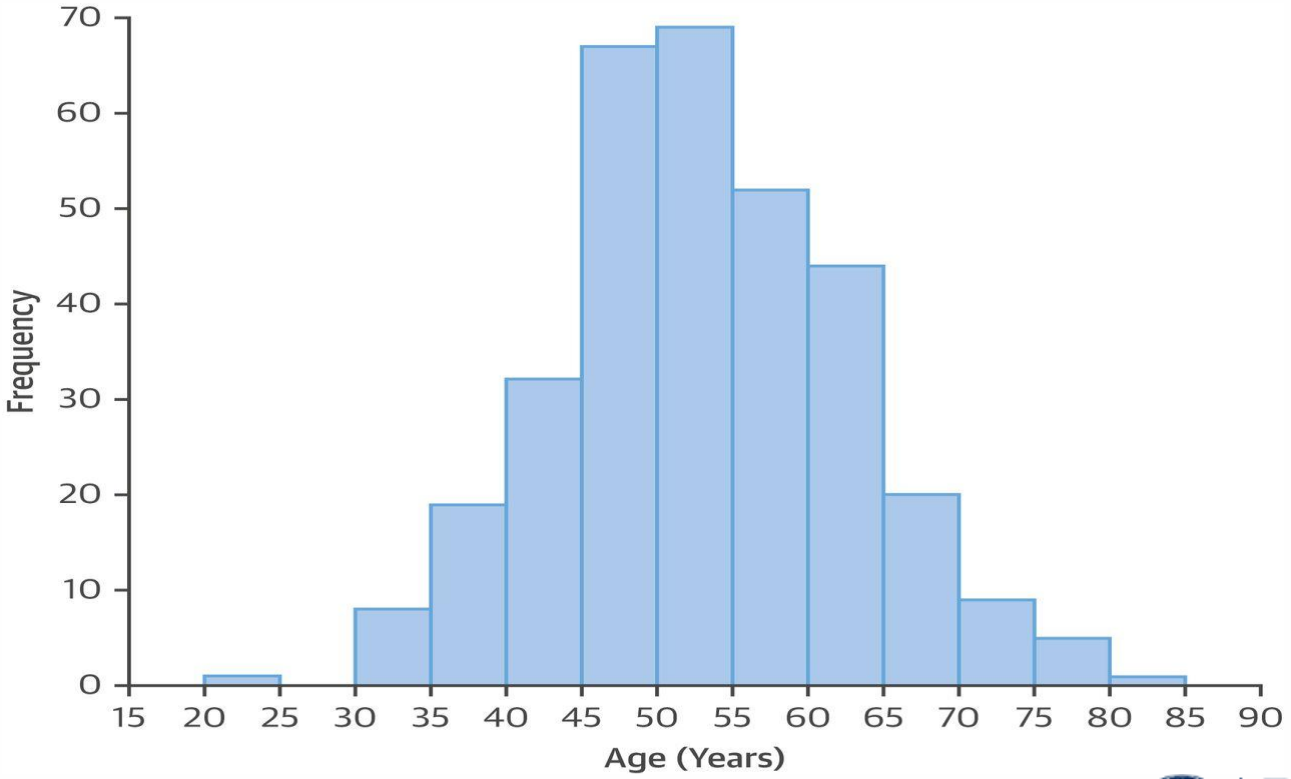
	Patients (N = 327)
Age, yrs	52.5 ± 9.6
Female	297 (90.8)
Body mass index, kg/m²	24.4 (21.5-28.3)
Race	
Caucasian	268 (82.0)
East Asian	35 (10.7)
South Asian	17 (5.2)
African Canadian	3 (0.9)
First nation	2 (0.6)
Diabetes mellitus	15 (4.6)
Dyslipidemia	84 (25.7)
Hypertension	119 (36.4)
Current smoker	32 (9.8)
Family history of coronary artery disease	109 (33.3)
Previous MI	3 (0.9)
Cerebrovascular disease	13 (4.0)
Hypothyroidism	43 (13.1)
Postmenopausal	169* (56.9)
Migraines	119 (36.4)
Depression	74 (22.6)
Anxiety	44 (13.5)

Values are mean ± SD, n (%), or median (interquartile range). *n = 297.
MI = myocardial infarction.

TABLE 2 Hospital Presentation

	Patients (N = 327)
Acute coronary syndrome	327 (100.0)
STEMI	84 (25.7)
NSTEMI	243 (74.3)
Normal ECG	63 (19.3)
Nonspecific ST-T changes	46 (14.1)
T inversions	80 (24.5)
ST depression	19 (5.8)
ST elevation <1 mm	22 (6.7)
VT/VF	29 (8.9)
Ejection fraction, %	57.0 (50.0-64.0)
Ejection fraction <50%	70 (21.8)
Left ventricular wall motion abnormality	
None	47 (14.4)
Hypokinesis	191 (58.4)
Akinesis	68 (20.8)
Dyskinesis	17 (5.2)
Precipitating factors	
Emotional stress	158 (48.3)
Physical stress	92 (28.1)
Heavy isometric activities	39 (11.9)

Values are n (%) or mean (interquartile range).
ECG = electrocardiogram; NSTEMI = non-ST-segment elevation myocardial infarction; STEMI = ST-segment elevation myocardial infarction; VF = ventricular fibrillation; VT = ventricular tachycardia.



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PREDISPOSING FACTORS

TABLE 4 Potential Predisposing Factors

	Patients (N = 327)
FMD	205 (62.7)
Systemic inflammatory condition	39 (11.9)
Connective tissue disorder	16 (4.9)
On hormonal therapy	38 (11.6)
Postpartum	7* (2.4)
Multiparous (≥4 births)	25* (8.8)
Grand multiparity (≥5 births)	7* (2.4)
Grand multigravida (≥5 pregnancies)	39* (11.9)
Idiopathic	91 (27.8)

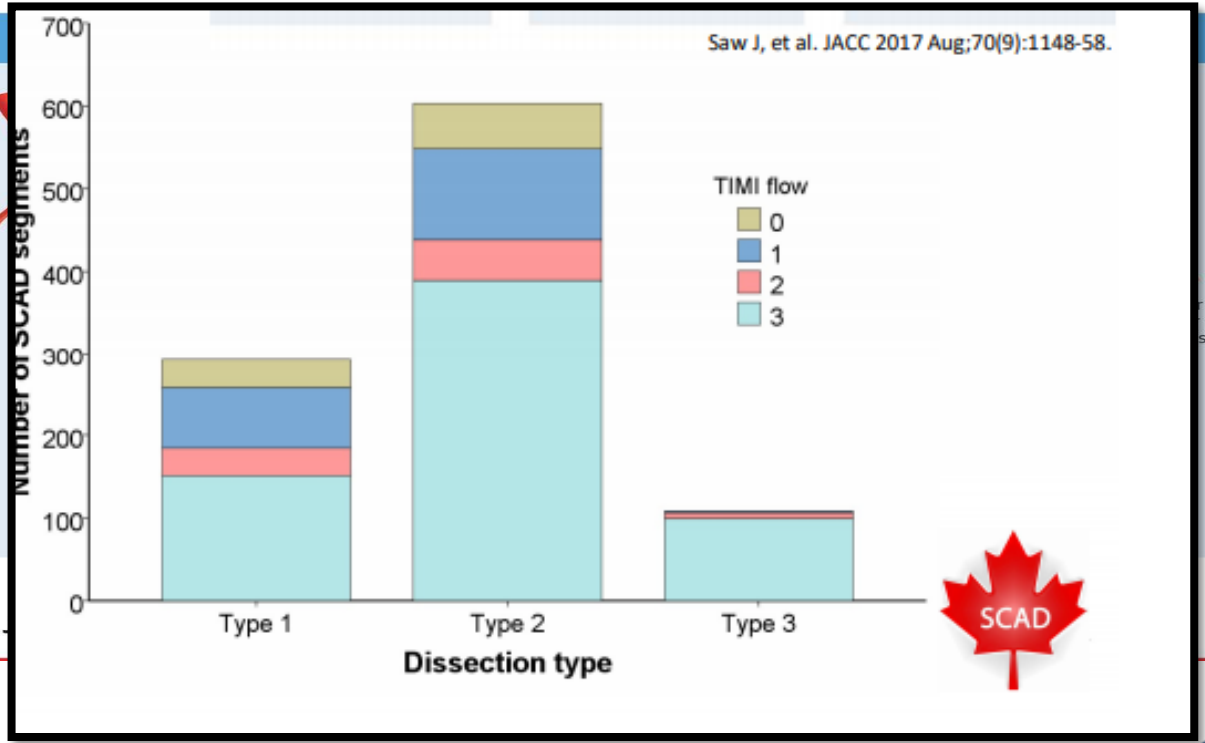
Values are n (%). *n = 297.
FMD = fibromuscular dysplasia.

TABLE 5 Involvement With Noncoronary FMD

	Patients
Prevalence of FMD	327
FMD diagnosed	205 (62.7)
FMD not diagnosed	122 (37.3)
FMD possible	17 (5.2)
Incomplete screening	63 (19.3)
Screened cerebrovascular, renal, iliac	42 (12.8)
FMD vascular involvement	205
Renal arteries	139 (67.8)
Iliac arteries	114 (55.6)
Cerebrovasculature	100 (48.8)
Cerebral aneurysm	29 (14.1)

Values are n or n (%).
FMD = fibromuscular dysplasia.

CENTRAL ILLUSTRATION: SCAD Classification



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VESSEL PATTERN

TABLE 3 Coronary Artery Angiographic Characteristics

	Patients (N = 327)
SCAD involving >1 coronary artery	46 (14.1)
Noncontiguous >1 artery involved	30 (9.2)
Coronary artery territory involved	387 dissections
Left main artery	2 (0.6)
Left anterior descending artery	175 (45.2)
Circumflex artery	123 (31.8)
Right coronary artery	89 (23.0)
SCAD lesion characteristics	387 dissections
Type 1 angiographic SCAD	99 (25.6)
Type 2 angiographic SCAD	270 (69.8)
Type 3 angiographic SCAD	18 (4.7)
Angiographic stenosis severity, %	78.4 ± 18.7
QCA dissection length, mm	42.7 ± 21.3
TIMI flow	
TIMI 0	51 (13.2)
TIMI 1	31 (8.0)
TIMI 2	46 (11.9)
TIMI 3	259 (66.9)

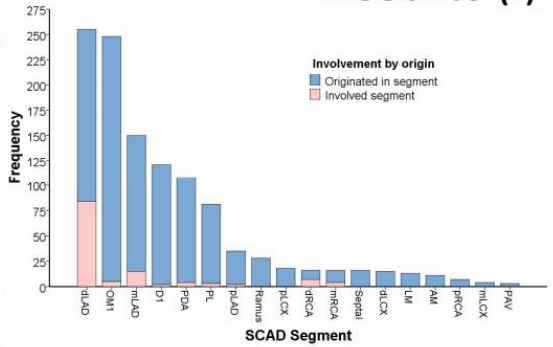
Values are n (%) or mean ± SD, unless otherwise indicated.

QCA = quantitative coronary angiography; SCAD = spontaneous coronary artery dissection; TIMI = Thrombolysis In Myocardial Infarction.

N (%), mean ± SD	N=750
Radial approach catheterization	556 (74.1%)
Femoral approach catheterization	192 (25.6%)
OCT-confirmed SCAD	41 (5.5%)
IVUS-confirmed SCAD	16 (2.1%)
Number of non-contiguous SCAD arteries	
1	652 (86.9%)
2	88 (11.7%)
3	10 (1.3%)
Number of affected SCAD segments	
1	561 (74.8%)
2	147 (19.6%)
3	24 (3.2%)
4	16 (2.1%)
5	1 (0.1%)
6	1 (0.1%)
≥2 segments	189 (25.2%)
Dissected coronary arteries	
LM	11 (1.5%)
LAD	391 (52.1%)
LCX	283 (37.7%)
RCA	174 (23.2%)
LM or prox LAD or prox LCX or prox RCA	57 (7.6%)

7.6%

Angiographic Results (1)



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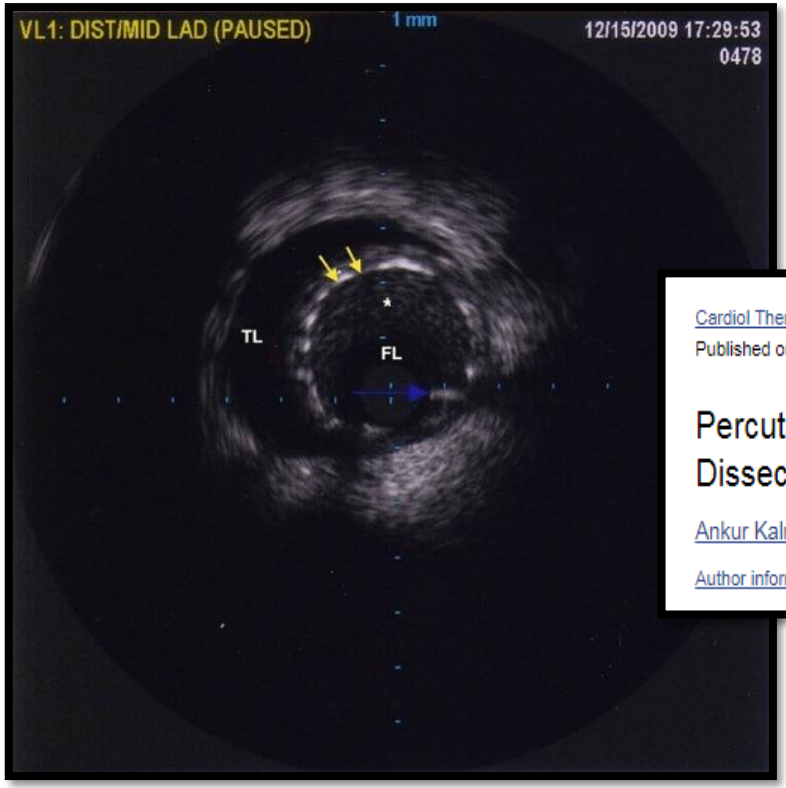
SCAD



Cardiol Ther. 2014 Dec; 3(1-2): 61–66.
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PMID: 25139465

Percutaneous Coronary Intervention in Spontaneous Coronary Artery Dissection: Role of Intravascular Ultrasound

Ankur Kalra,✉ Avin Aggarwal, Rachel Kneeland, and Jay H. Traverse

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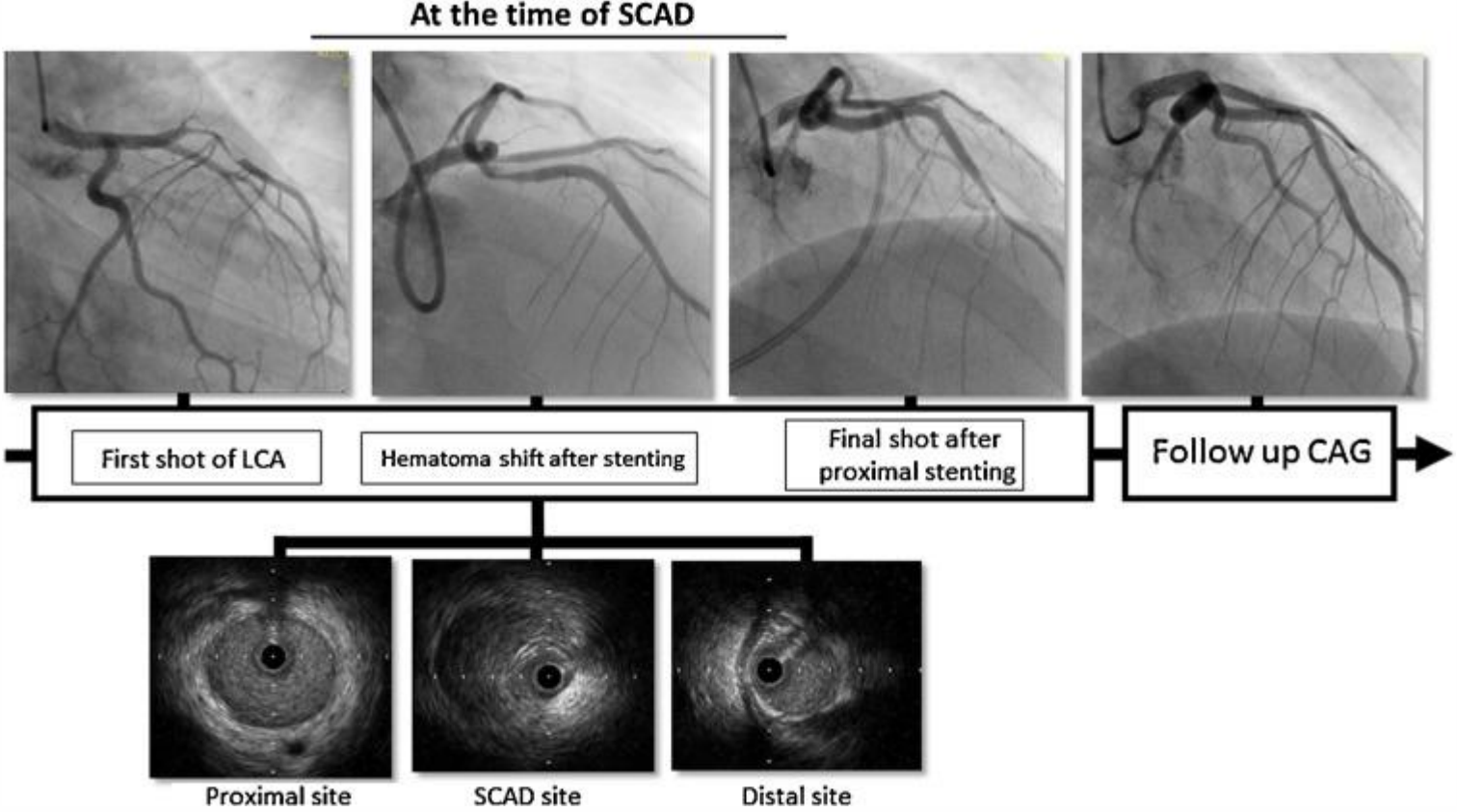
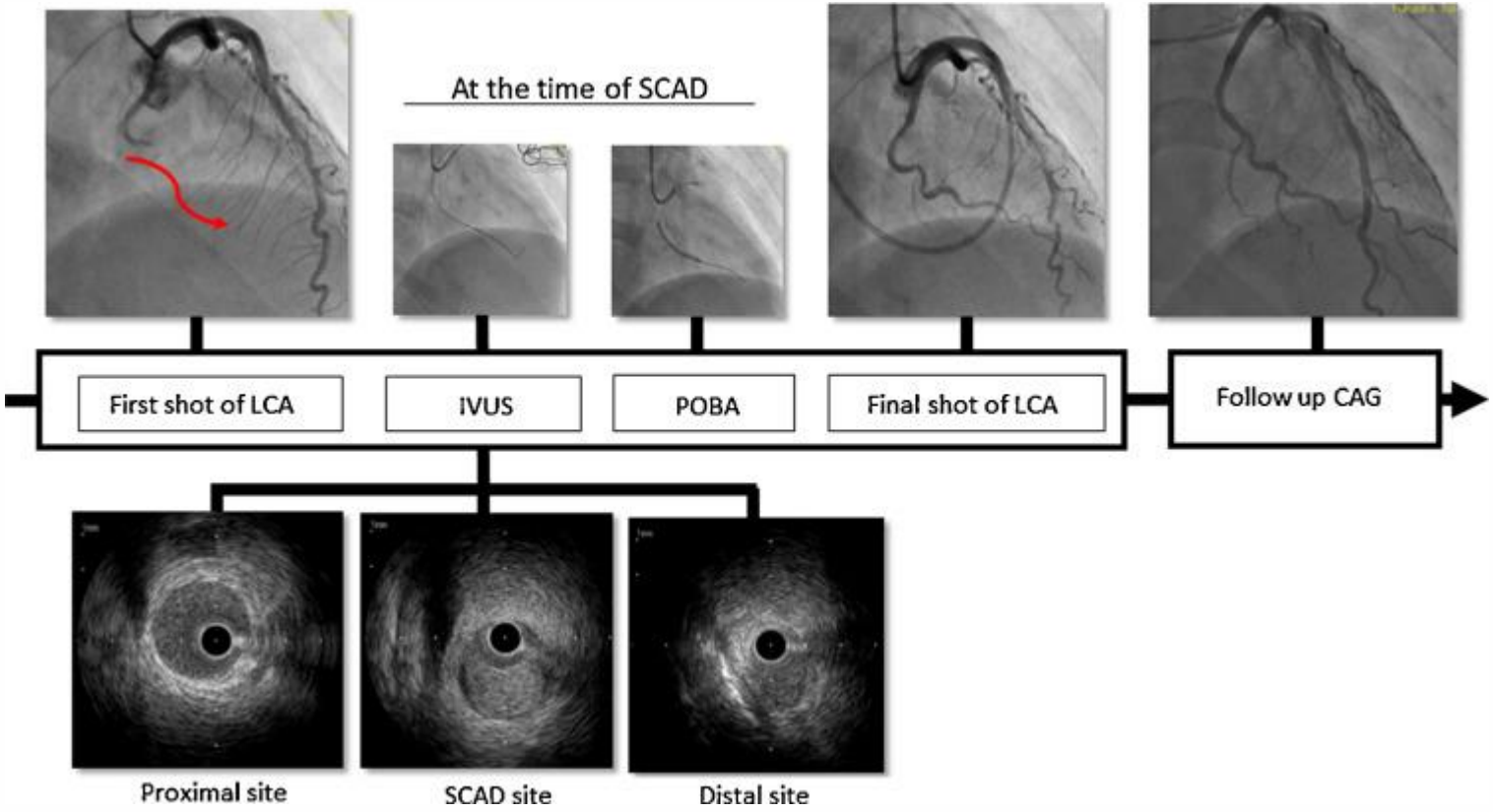

At the time of SCAD
First shot of LCA
Hematoma shift after stenting
Final shot after proximal stenting
Follow up CAG
Proximal site
SCAD site
Distal site


At the time of SCAD
First shot of LCA
IVUS
POBA
Final shot of LCA
Follow up CAG
Proximal site
SCAD site
Distal site

OUTCOMES

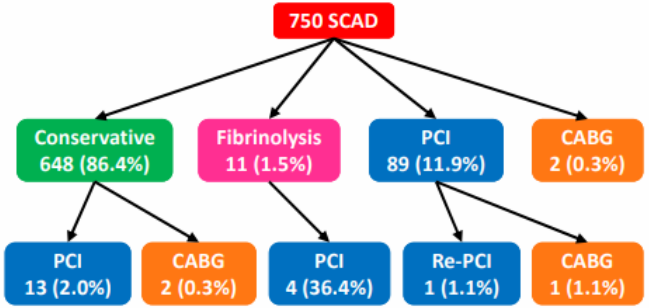
TABLE 6 In-Hospital and Follow-Up MACE

	Patients (N = 327)
In-hospital events	
Death	0 (0.0)
MI	15 (4.6)
Stroke/TIA	5 (1.5)
Unplanned revascularization	14 (4.3)
Cardioversion or ICD	9 (2.8)
Overall major adverse events	24 (7.3)
Long-term events	
Death	0.3
MI	4.8
Recurrent de novo SCAD	2.8
Stroke/TIA	0.3
Revascularization	1.5
Overall MACE	5.8
Angina hospitalization	2.0

Values are n (%) or %/yr.

ICD = implantable cardioverter-defibrillator; MACE = major adverse cardiac events; TIA = transient ischemic attack; other abbreviations as in Tables 1 and 3.

Revascularization:



Rationale for revascularization [n(%)]	N=110
Ongoing chest pain	43 (39.1%)
Ongoing ischemia on ECG	38 (34.5%)
Dissection causing severe stenosis	35 (31.8%)
Proximal LAD, RCA, or LCX dissection	25 (22.7%)
Large artery (>3mm) dissection	16 (14.5%)
Iatrogenic catheter-induced dissection	10 (9.1%)
Left main dissection	9 (8.2%)
Ventricular arrhythmia	8 (7.3%)
Recurrent chest pain in-hospital	6 (5.5%)
Hemodynamic instability (shock)	6 (5.5%)
Multiple coronary dissections	6 (5.5%)

PCI Strategy [n(%)]	N=750
Treatment strategy	
Conservative	632 (84.3%)
Fibrinolysis	11 (1.5%)
Revascularization (PCI or CABG)	110 (14.7%)
PCI	106 (14.1%)
CABG	5 (0.7%)
SCAD PCI Procedures & Outcomes	N=103
Wiring only	15 (14.6%)
Balloon angioplasty	21 (20.4%)
- Cutting balloon	5 (4.9%)
Stent placement	67 (65.0%)
Number of stents implanted	
1	21/67 (31.4%)
2	23/67 (34.1%)
3	15/67 (22.4%)
4 or more	8/67 (11.9%)

PCI Outcomes [n(%)]	N=750
Final TMI Flow	
0	16 (15.7%)
1	6 (5.9%)
2	13 (12.7%)
3	67 (65.7%)
PCI effect on TIMI flow	
Improved	59 (57.6%)
Unchanged	40 (38.8%)
Worse	4 (3.9%)
Propagation of SCAD during PCI	33 (32.0%)
Overall PCI success	
Successful	30 (29.1%)
Partial success	42 (40.8%)
Unsuccessful	31 (30.1%)

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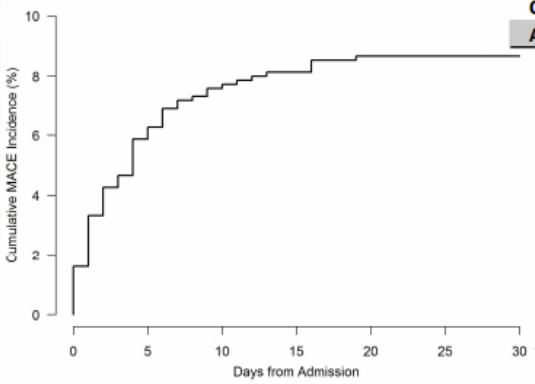
SCAD

In-hospital MAE & 30-day MACE

N (%)	N=750
Overall In-hospital MAE	66 (8.8%)
Death	1 (0.1%)
Recurrent MI	30 (4.0%)
- Extension of SCAD segment	15 (50%)
- Iatrogenic dissection	9 (30%)
- Other	6 (20%)
Severe ventricular arrhythmia	29 (3.9%)
- requiring ICD	6 (0.8%)
Cardiogenic shock	15 (2.0%)
- Use of Inotropes	9 (1.2%)
- IABP	6 (0.8%)
- LVAD	2 (0.3%)
- ECMO	2 (0.3%)
- LV rupture requiring surgery	1 (0.1%)
- Heart Transplant	0 (0%)
Unplanned revascularization	19 (2.5%)
Stroke/TIA	6 (0.8%)
Congestive heart failure	2 (0.3%)

Median hospital stay 4 days (3, 5)

N (%)	N=750
Total 30-day MACE	66 (8.8%)
Death	1 (0.1%)
Recurrent MI	46 (6.1%)
Unplanned revascularization	20 (2.7%)
Stroke/TIA	9 (1.2%)
Congestive heart failure	3 (0.4%)
Other complications w/in 30d	
Pericarditis	14 (1.9%)
New atrial fibrillation	7 (0.9%)
Cardiac emergency room visit	37 (4.9%)
Admission for chest pain	19 (2.5%)



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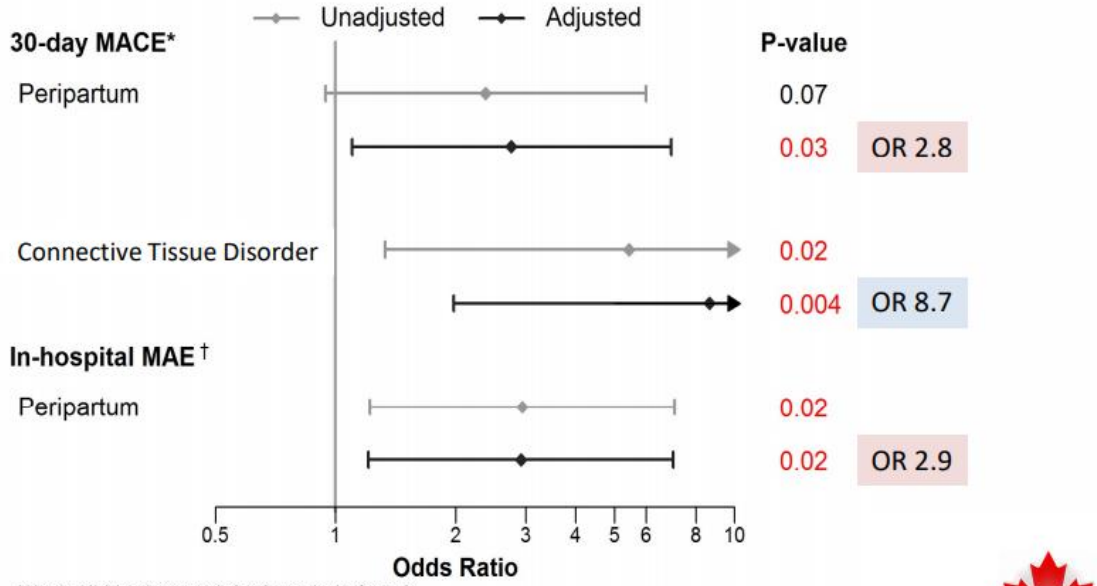
SCAD

Predictors: In-hospital MAE & 30-day MACE



* Adjusted model includes peripartum, connective tissue disease, and number of pregnancies
† Adjusted model includes peripartum, connective tissue disease, and history of smoking

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SCAD

Rx

TABLE 7 Medications at Discha

Aspirin
Clopidogrel (or other ADP antagonist)
Beta-blocker
Calcium-channel blocker
Statin
ACE inhibitor/ARB
Nitroglycerin

Values are n (%). *Incomplete data for
ACE = angiotensin-converting enz
ARB = angiotensin-receptor blocker.

Medications: At Discharge & Follow-up

	Discharge N=749	Last follow-up N=749
ASA	702 (93.7)	668 (89.2)
Clopidogrel (or other ADP antagonist)	505 (67.4)	268 (35.8)
Beta-blocker	632 (84.8)	592 (79.0)
ACE inhibitor/ARB	430 (57.4)	361 (48.2)
Statin	413 (55.1)	300 (40.1)
Nitroglycerin	110 (14.7)	62 (8.3)
Calcium-channel blocker	78 (10.4)	72 (9.6)
Oral anticoagulant	19 (2.5)	41 (5.5)

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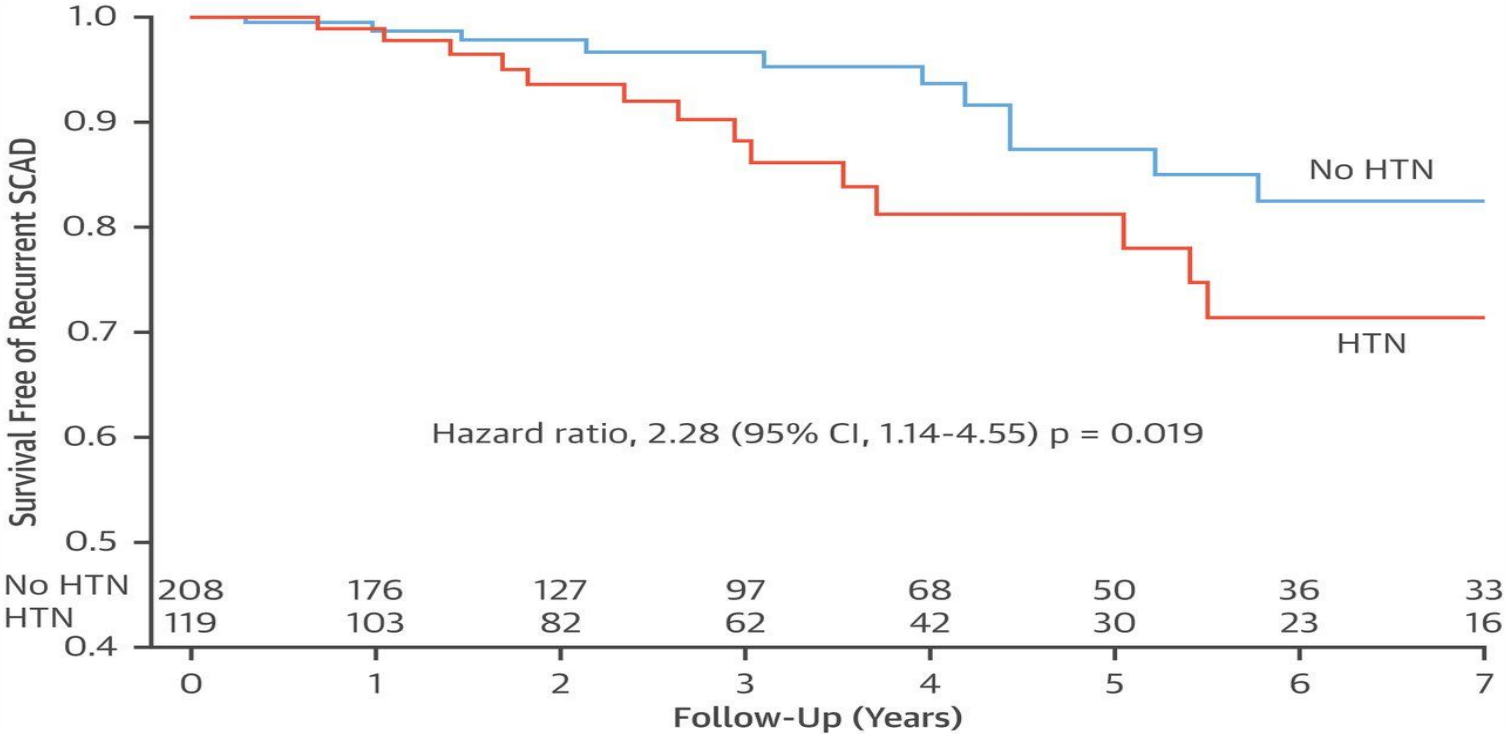
SCAD



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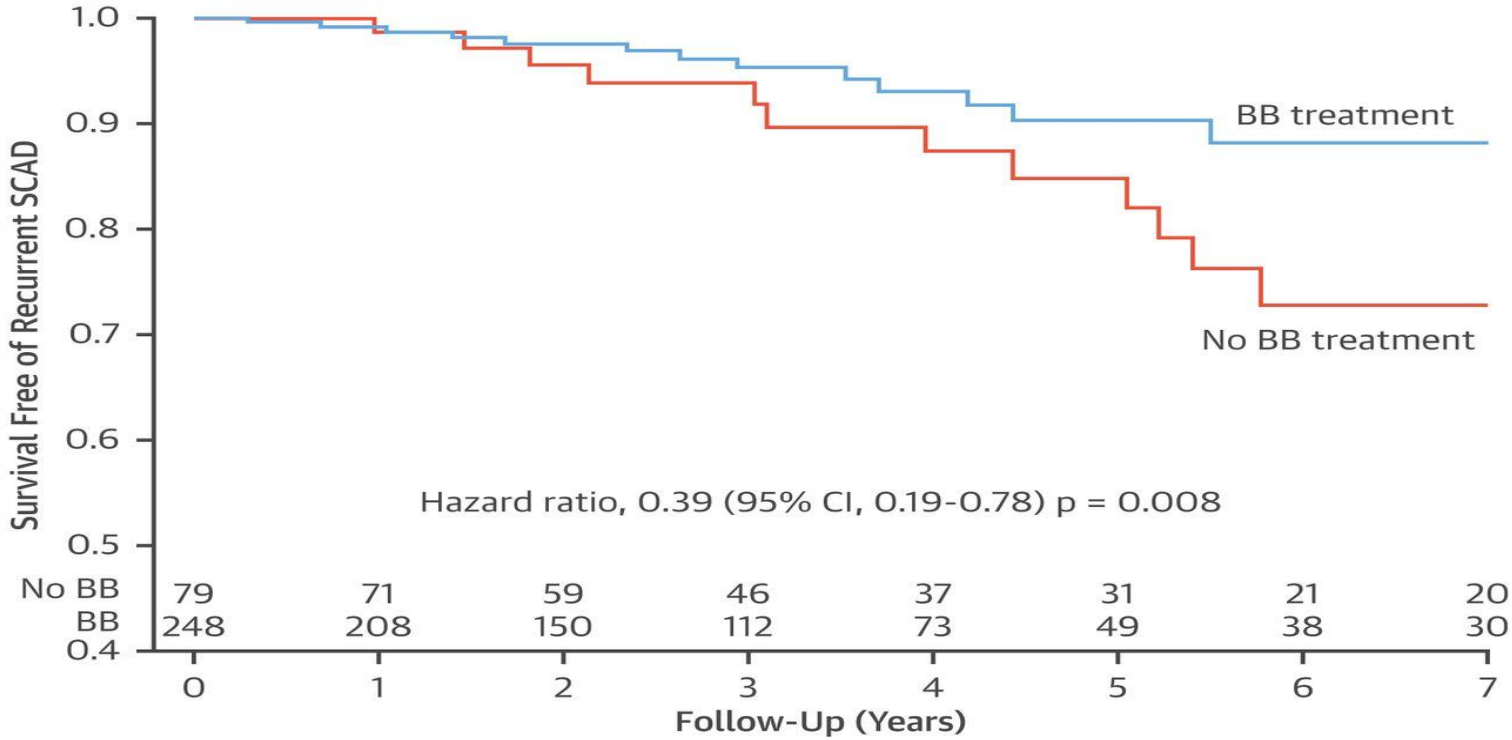

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CONCLUSIONS In our large prospectively followed SCAD cohort, long-term cardiovascular events were common. Hypertension increased the risk of recurrent SCAD, whereas beta-blocker therapy appeared to be protective. (J Am Coll Cardiol 2017;70:1148–58) © 2017 by the American College of Cardiology Foundation.

In our large, prospectively followed SCAD cohort, a predominantly conservative treatment strategy was associated with low in-hospital adverse events. However, long-term cardiovascular events were common, especially recurrent MI due to recurrent SCAD. Hypertension was significantly associated with an increased risk of recurrent SCAD, whereas beta-blocker use was significantly associated with reduced risk of recurrent SCAD.

Areas for Further Exploration

- Role of Cardiac CT
- Duration of hospitalization and Follow up
- Current and future pregnancies