31 GIORNATE CARDIOLOGICHE TORINESI

TURIN
October
24th-26th
2019

PRAGMATIC APPROACH TO ACUTE MYOCARDITIS

Enrico Ammirati, MD, PhD, FESC

Sistema Socio Sanitario
Ospedale Niguarda
Regione Lombardia

OSPEDALE NIGUARDA CA' GRANDA
"DE GASPERIS" CARDIO CENTER

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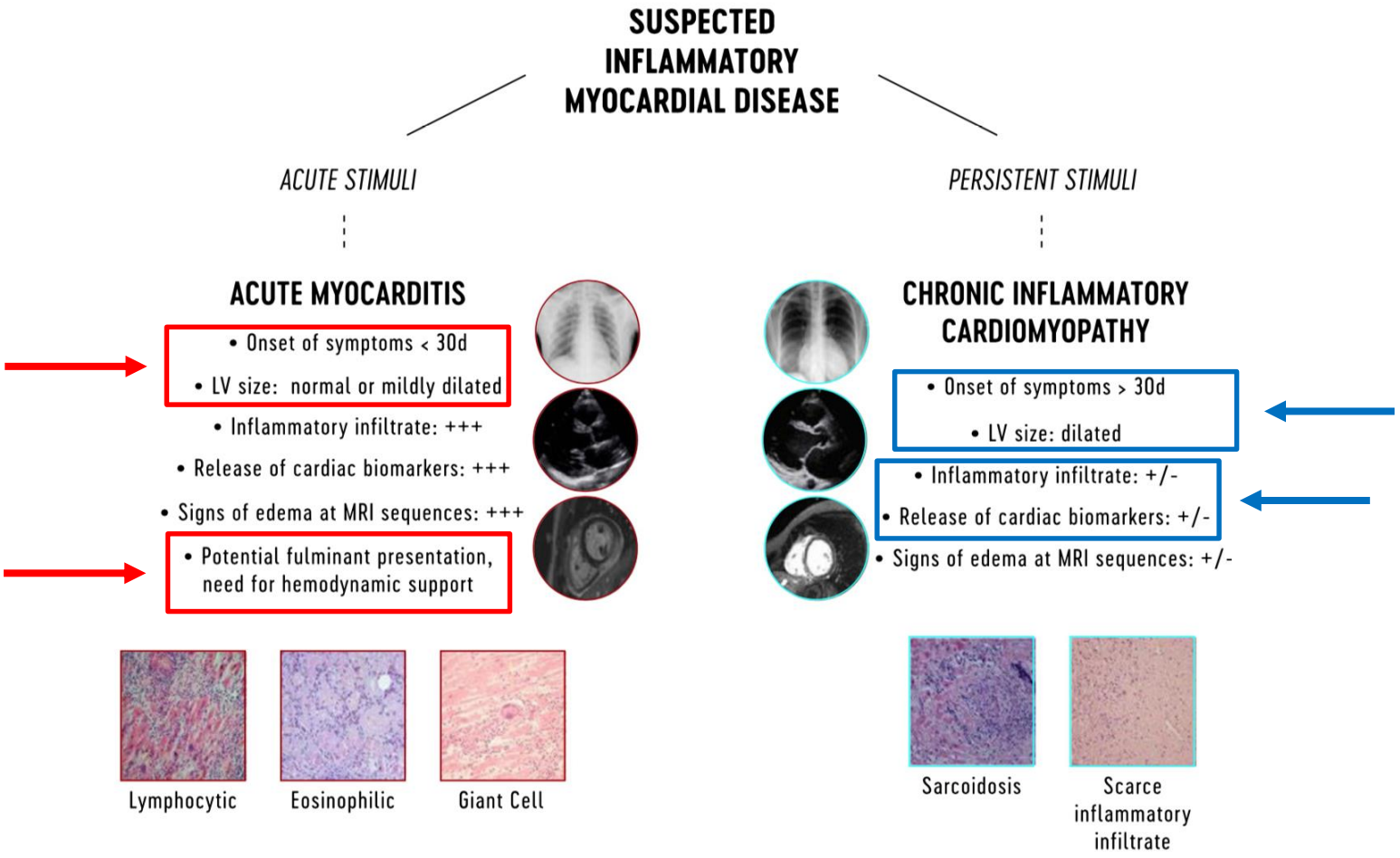
• CONTROVERSIES

- **ACUTE MYOCARDITIS (AM) vs. CHRONIC INFLAMMATORY CARDIOMYOPATHY (infl-CMP) (ACUTE or CHRONIC?)**
- **NEW DATA FROM THE INTERNATIONAL REGISTRY ON MYOCARDITIS (FM BETTER or WORST?)**
- **PROPOSED MANAGEMENT/TREATMENTS OF COMPLICATED ACUTE/FM (TO EMB or NOT TO EMB?) (STEROIDS or NOT STEROIDS?)**

ACUTE vs. CHRONIC INFLAMMATORY MYOCARDIAL DISEASE



Ammirati 2018

Curr Cardiol Rep

OVERLAPPING THEORIES OF COMMON CAUSES OF AM and infl-CMP

Inflammatory Cardiomyopathic Syndromes

Barry H. Trachtenberg, Joshua M. Hare

CIRCULATION RESEARCH
2017

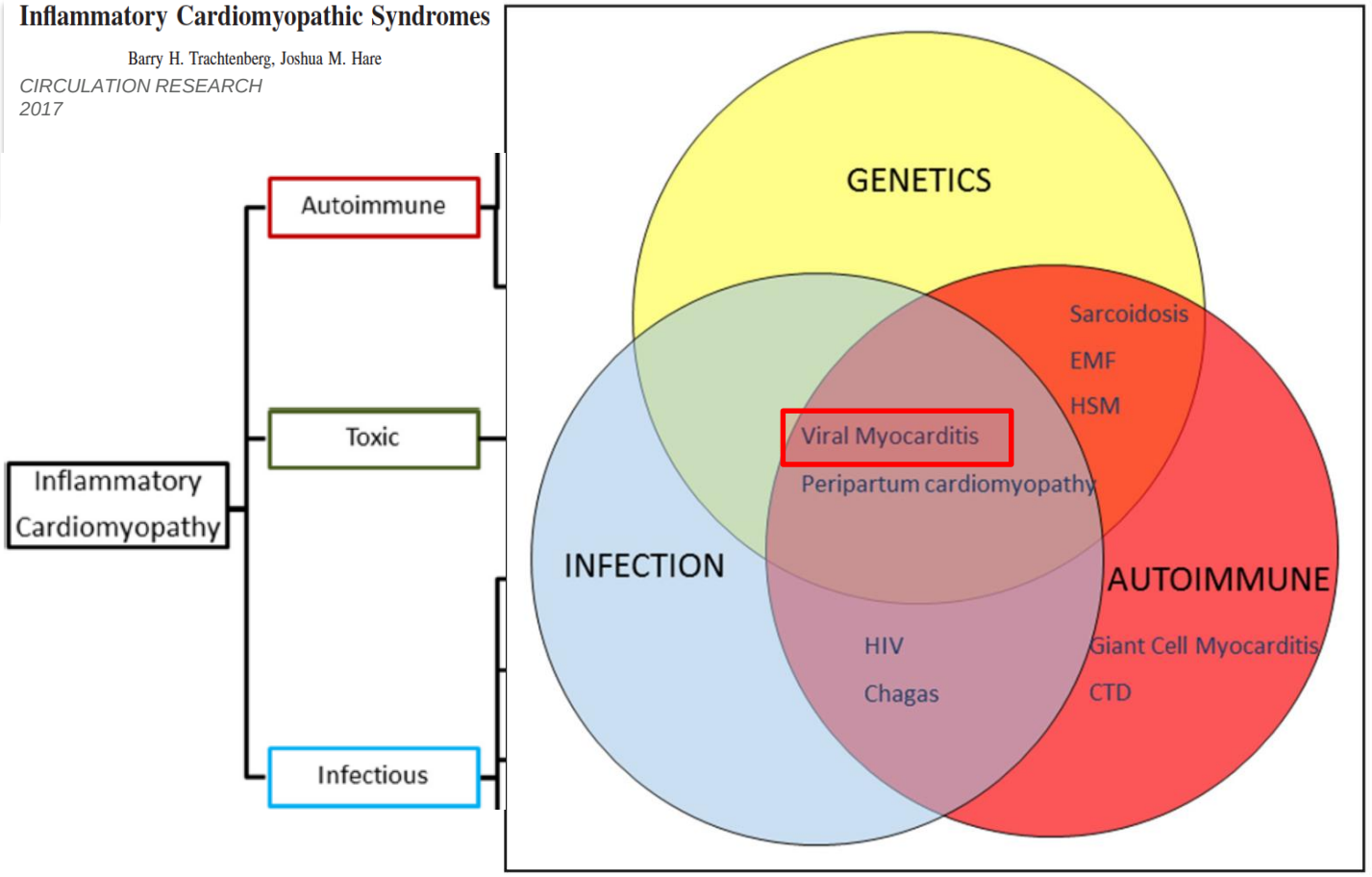


Figure 3. Venn diagram showing current evidence for overlapping theories of common causes of inflammatory cardiomyopathy. CTD indicates connective tissue disorders; EMF, endomyocardial fibrosis; and HSM, hypersensitivity myocarditis.

SPECIFIC ETIOLOGIES OF AM AND infl-CMP

SPECIFIC INFECTIVE MYOCARDITIS

***Lyme disease**

*Bacterial myocarditis (Diphteric myocarditis)

*HIV myocarditis

*Associated with viral infections (i.e. **H1N1 influenza** –unknown if direct damage of the virus of related to the immune response)

*HELMINTH PARASSITE - Toxacara canis associated EM

AUTOIMMUNE MYOCARDITIS:

*Myocarditis associated with autoimmune disorders (i.e. Systemic Lupus Erythematosus; scl-70+ systemic sclerosis)

*Myocarditis associated with other inflammatory disorders (i.e. Inflammatory Bowel disorders)

*Myocarditis associated with vasculitides (i.e. GPA granulomatosis with poly-angiioitis disease- Wegener, EGPA eosinophilic GPA – Churg Strauss syndrome)

MYOCARDITIS ASSOCIATED WITH TOXIC AGENTS:

***IMMUNE CHECKPOINTS INHIBITORs** (ICI - i.e novalimub)

*Chemotherapy

*Cocaine

MYOCARDITIS ASSOCIATED WITH PHEOCHROMOCYTOMAc

Lancet 2012

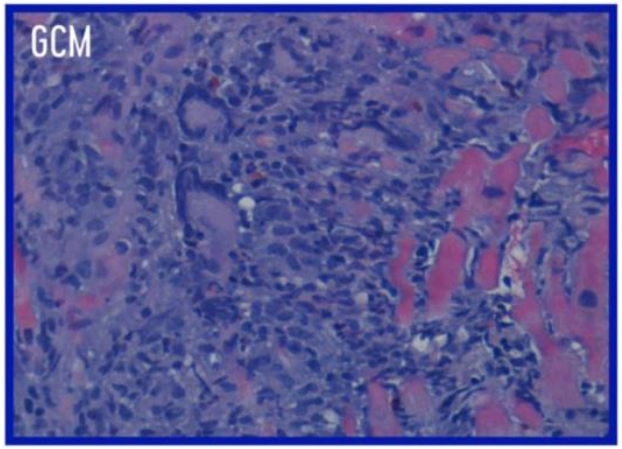
HISTOLOGY IN FM

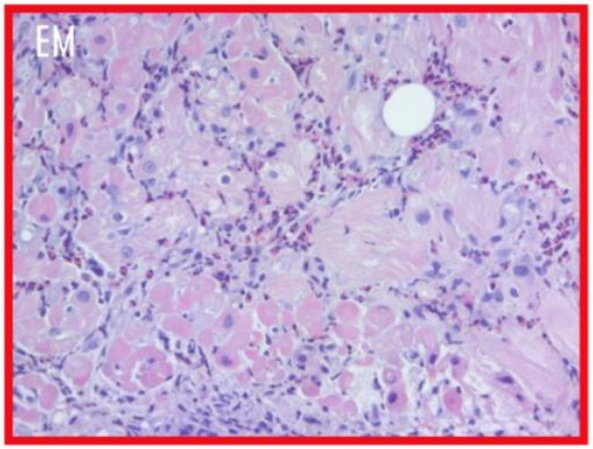
Histology

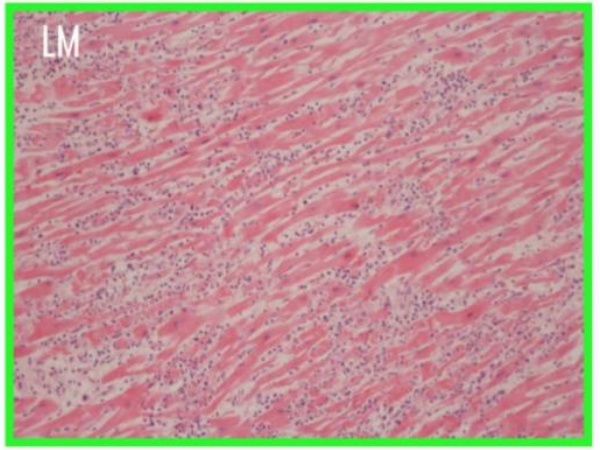
- Eosinophilic
- Giant cell
- Granulomatous (Cardiac sarcoidosis)
- Lymphocytic

All histologies can clinically present as FULMINANT MYOCARDITIS

Sagar, Cooper







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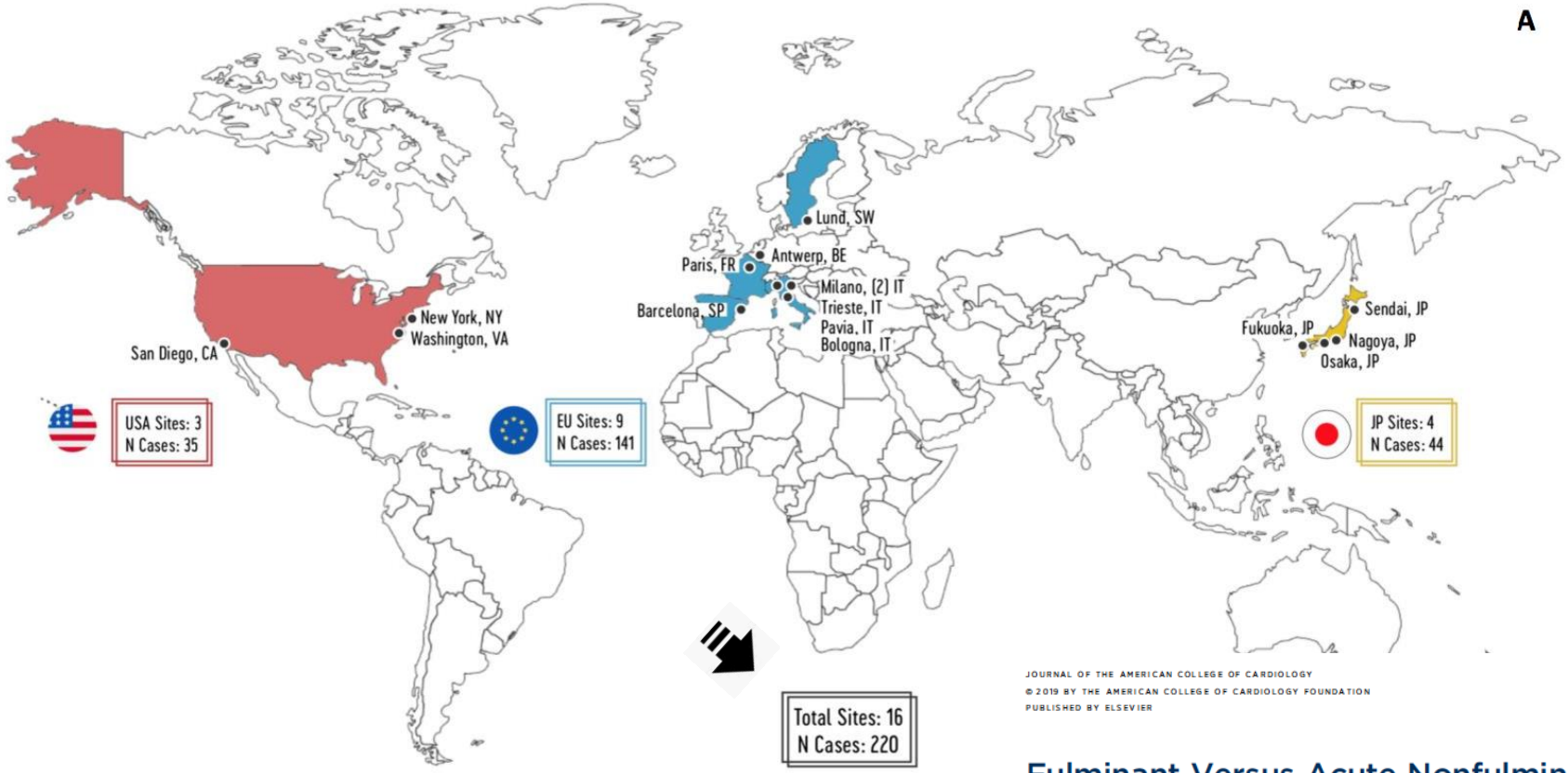
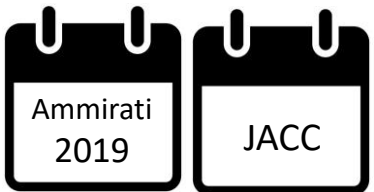


RETROSPECTIVE REGISTRY
ALL admitted to hospital
ALL HISTOLOGY PROVEN M.
ALL with LVEF<50%
SYMPTOMS' ONSET within 30 days



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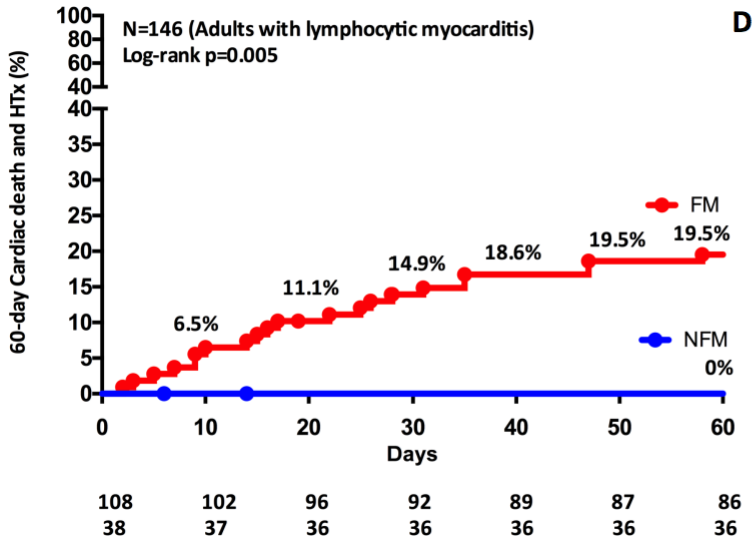
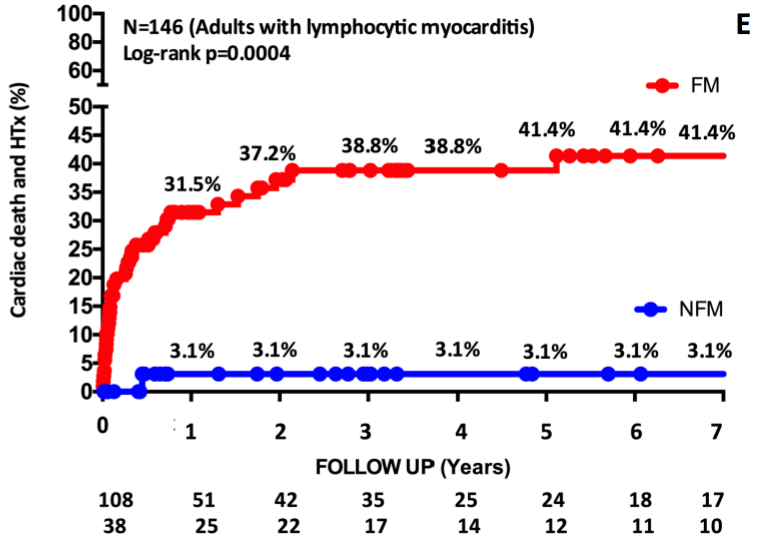
Fulminant Versus Acute Nonfulminant Myocarditis in Patients With Left Ventricular Systolic Dysfunction

Enrico Ammirati, MD, PhD,[a] Giacomo Veronese, MD,[a,b] Michela Brambatti, MD, MS,[c] Marco Merlo, MD,[d] Manlio Cipriani, MD,[a] Luciano Potena, MD,[e] Paola Sormani, MD,[a] Tatsuo Aoki, MD, PhD,[f] Koichiro Sugimura, MD,[f] Akinori Sawamura, MD, PhD,[g] Takahiro Okumura, MD, PhD,[g] Sean Pinney, MD,[h] Kimberly Hong, MD,[c] Palak Shah, MD, MS,[i] Öscar Braun, MD, PhD,[j] Caroline M. Van de Heyning, MD, PhD,[k] Santiago Montero, MD,[l,m] Duccio Petrella, MD,[a] Florent Huang, MD,[m] Matthieu Schmidt, MD,[m] Claudia Raineri, MD,[n] Anuradha Lala, MD,[h] Marisa Varrenti, MD,[a,b] Alberto Foà, MD,[e] Ornella Leone, MD,[e] Piero Gentile, MD,[d] Jessica Artico, MD,[d] Valentina Agostini, PhD,[e] Rajiv Patel, MD,[i] Andrea Garascia, MD,[a] Emeline M. Van Craenenbroeck, MD, PhD,[k] Kaoru Hirose, MD,[o] Akihiro Isotani, MD,[o] Toyoaki Murohara, MD, PhD,[g] Yoh Arita, MD, PhD,[p] Alessandro Sionis, MD,[l] Enrico Fabris, MD,[d] Sherin Hashem, MD, PhD,[q] Victor Garcia-Hernando, MD,[l] Fabrizio Oliva, MD,[a] Barry Greenberg, MD,[c] Hiroaki Shimokawa, MD,[f] Gianfranco Sinagra, MD,[d] Eric D. Adler, MD,[c] Maria Frigerio, MD,[a,*] Paolo G. Camici, MD[r,*]

SHORT AND LONG-TERM OUTCOME IN ADULTS with LYMPHOCYTIC MYOCARDITIS

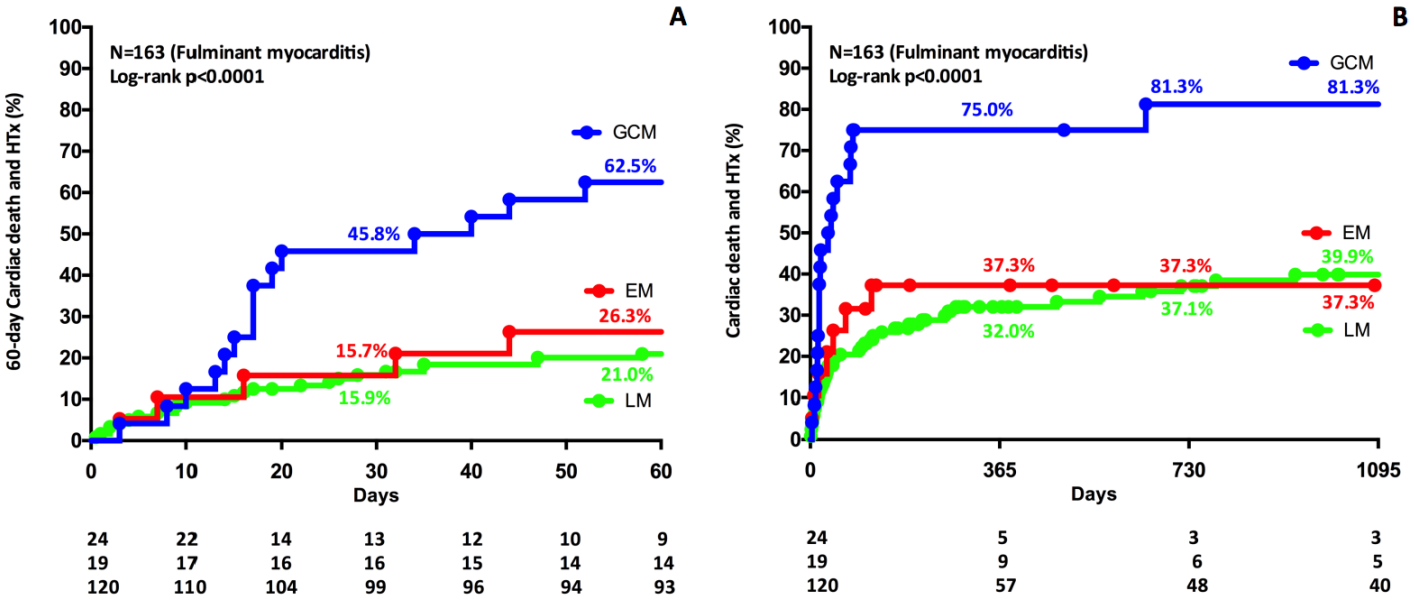




FM have worse prognosis compared with NFM ALSO considering ONLY ADULT lymphocytic myocarditis

Ammirati E, Veronese G et al. JACC. 2019

SHORT AND LONG-TERM OUTCOME BASED ON HISTOLOGY IN FM



GIANT CELL MYOCARDITIS *IS ASSOCIATED WITH POOR OUTCOME IN THE SHORT and LONG TERM among FM*

Ammirati E, Veronese G et al. JACC. 2019

TABLE 4 Univariate and Multivariate Analysis of Factors Associated With the Occurrence of Cardiac Death and HTx in the Overall Population

Overall (N = 220)	Patients With Available Data	HR (95% CI) for Cardiac Mortality or HTx			
		60-Day Follow-Up		Long-Term Follow-Up	
		Univariate	Multivariate	Univariate	Multivariate
Fulminant presentation	220	17.14 (2.36-124.3)	14.52 (1.67-126.2)*	5.95 (2.40-14.77)	5.08 (1.65-15.68)*
Female	220	0.92 (0.52-1.64)	–	0.80 (0.51-1.26)	–
Age	220	1.01 (0.99-1.03)	–	1.01 (0.99-1.02)	–
Histologic subtypes	220				
Lymphocytic		1 (reference)	1 (reference)	1 (reference)	1 (reference)
Eosinophilic		1.34 (0.55-3.28)	1.91 (0.70-5.17)	1.33 (0.67-2.65)	1.76 (0.84-3.66)
GCM		4.48 (2.35-8.53)	3.24 (1.41-7.44)*	3.75 (2.18-6.45)	3.48 (1.81-6.70)*
Sarcoidosis		1.07 (0.14-7.94)	–	0.61 (0.08-4.43)	–
Admission LVEF ≤30%	220	1.80 (0.89-3.63)	–	2.05 (1.17-3.62)	1.62 (0.87-3.04)
Immunosuppression	216	0.94 (0.52-1.74)	–	0.78 (0.48-1.24)	–
ECG findings					
QRS interval >120 ms	198	2.62 (1.35-5.05)	2.25 (1.09-4.62)*	2.26 (1.37-3.72)	2.49 (1.44-4.28)*
ST-segment elevation	208	0.79 (0.29-1.30)	–	0.82 (0.49-1.38)	–
Cardiac arrest†	213	3.41 (1.86-6.24)	1.13 (0.49-2.61)	2.68 (1.64-4.37)	1.32 (0.73-2.40)
Advanced AV block†	220	2.49 (1.05-5.89)	1.49 (0.47-4.75)	1.73 (0.75-4.00)	–
Prodromal symptoms	219	0.90 (0.49-1.64)	–	0.72 (0.45-1.15)	–
Year of admission	220		–		–
2001-2010	70	1 (reference)	–	1 (reference)	–
2011-2018	150	1.34 (0.69-2.59)	–	1.40 (0.85-2.33)	–

FULMINANT ***PRESENTATIO***

GIANT CELL ***HISTOLOGY***

QRS duration ***>120 ms***

Ammirati E, Veronese G et al. JACC. 2019

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PROPOSED MANAGEMENT OF ACUTE MYOCARDITIS

HF SYMPTOMS AT ADMISSION	LVEF AT FIRST ECHO	TROPONIN RELEASE	ASSOCIATED FEATURES			
			VENTRICULAR ARRHYTHMIAS QRS >120 ms	ADVANCED AV HEART BLOCK	AUTOIMMUNE DISEASE	TRIGGERS (i.e. allergens)
Severe/FM	Low (<40%)	Very high	ECG: MARKERS OF RISK		CONDITIONS SUGGESTING ETIOLOGY	

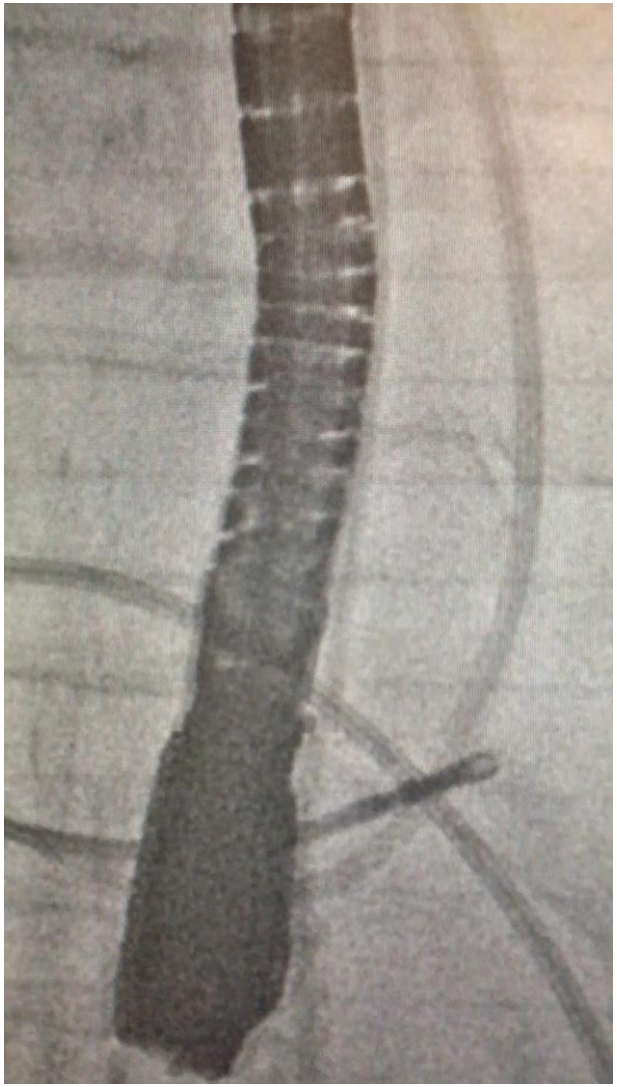
CLINICAL PRESENTATION

ASSOCIATED FEATURES

Ammirati 2018 Curr Cardiol Rep

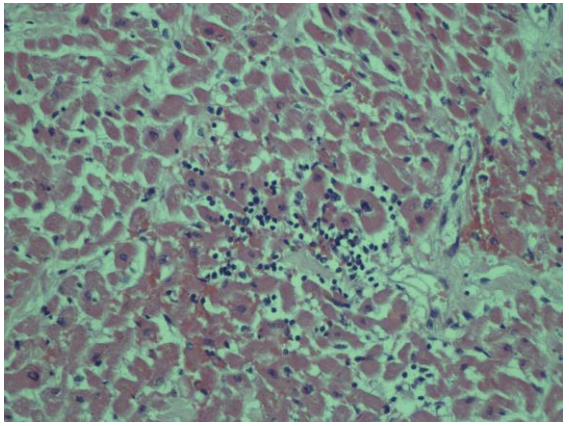
- ☑ **STABILIZE the patient with inotropes/MCS**
- ☑ **CONSIDER REFERRING the patient to a HTX center**
- ☑ **PERFORM EMB ASAP when you have stabilized the patient**
- ☑ **NO ROOM for cardiac MRI in this setting**
- ☑ **IV STEROIDS as first line immunosuppression**

TREATMENT



REMIND: EMB is FEASIBLE and relatively SAFE also in patients on ECMO

HISTOLOGY HAS CLINICAL RELEVANCE IN FM

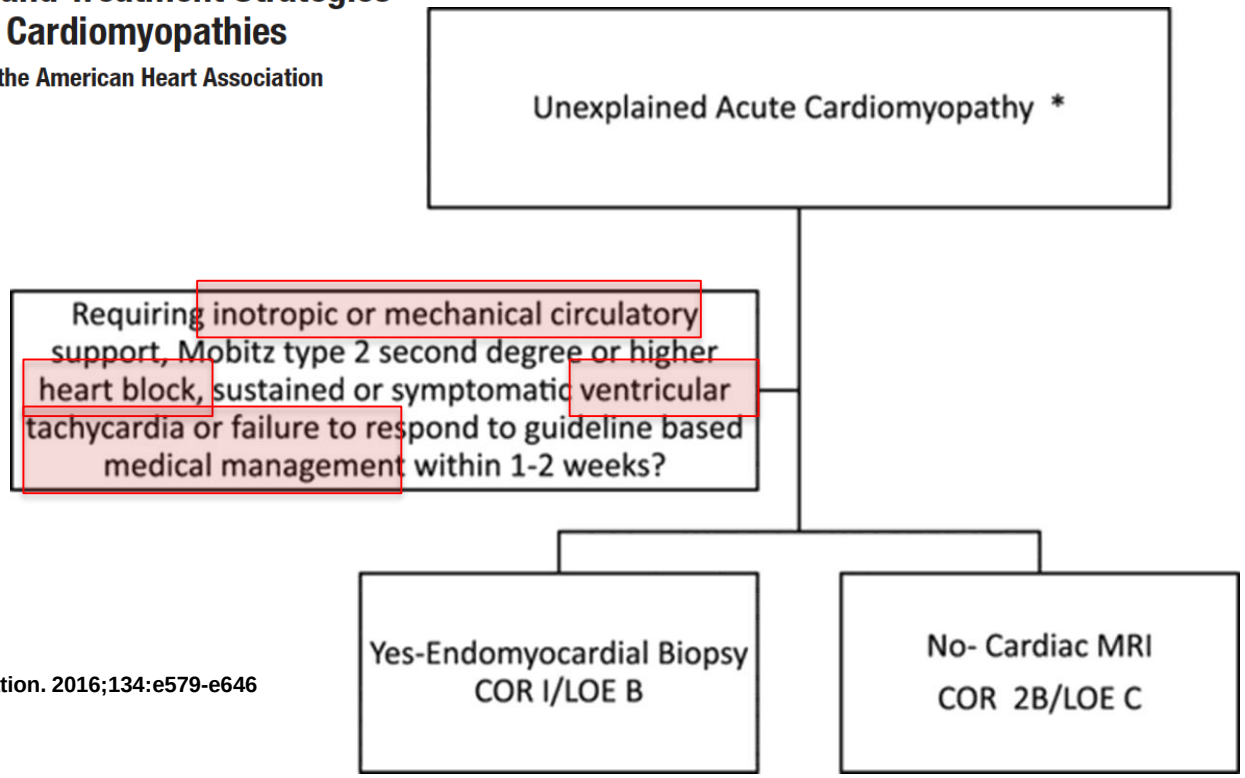


ALGORITHM FOR THE EVALUATION OF SUSPECTED MYOCARDITIS IN THE SETTING OF UNEXPLAINED ACUTE CARDIOMYOPATHY

AHA SCIENTIFIC STATEMENT

Current Diagnostic and Treatment Strategies for Specific Dilated Cardiomyopathies

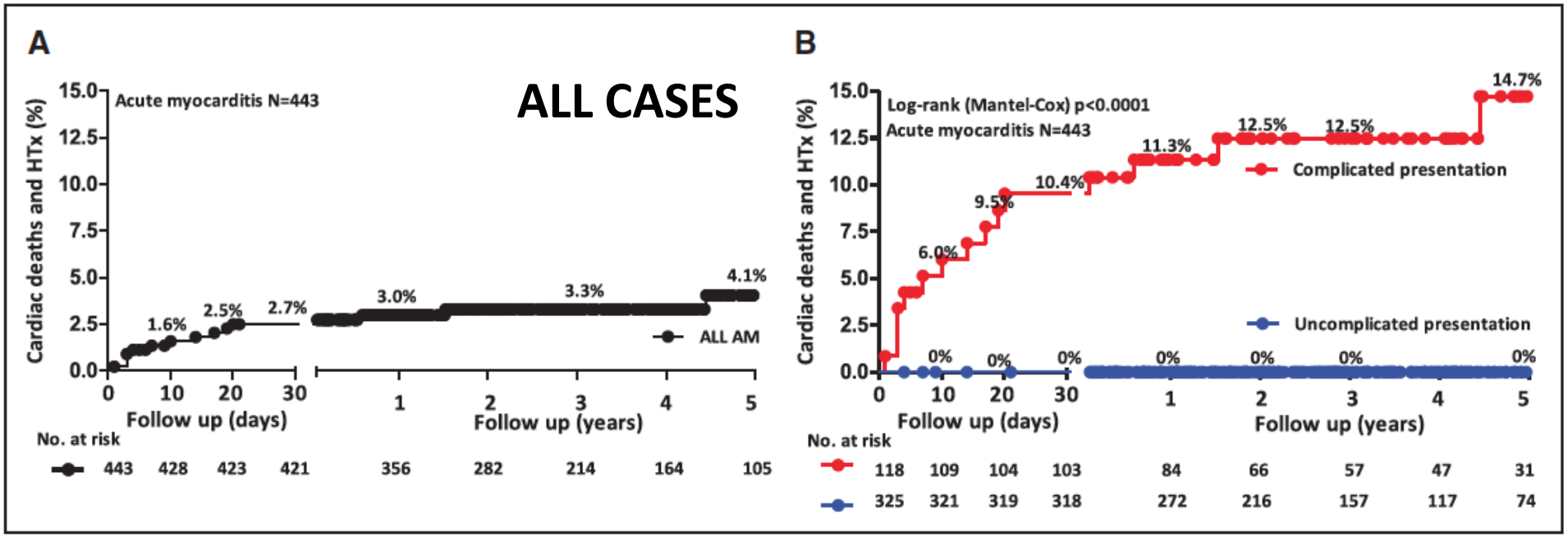
A Scientific Statement From the American Heart Association



Biykem Bozkurt et al. Circulation. 2016;134:e579-e646

American Heart Association

LONG-TERM OUTCOME (cardiac death+HTx) IN AM BASED ON CLINICAL PRESENTATION



Circulation

ORIGINAL RESEARCH ARTICLE

Clinical Presentation and Outcome in a Contemporary Cohort of Patients With Acute Myocarditis

Multicenter Lombardy Registry

BACKGROUND: There is controversy about the outcome of patients with acute myocarditis (AM), and data are lacking on how patients admitted

Enrico Ammirati, MD, PhD*

COMPLICATED

*LVEF<50% on first ECHO

*Sustained Ventricular Arrhythmias

*Hemodynamic instability at presentation (FM)

UNCOMPLICATED CASES

- **CONCLUSIONS**

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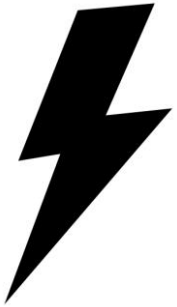
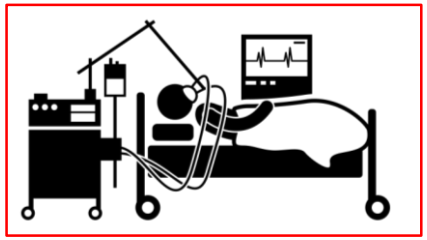
TAKE HOME MESSAGE ON FM

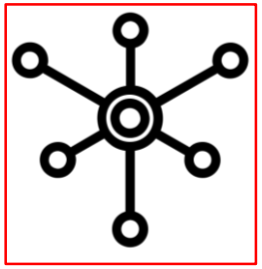
1. EARLY RECOGNITION
2. FROM THE SPOKE HOSPITAL TO THE **HUB**
3. AGGRESSIVE SUPPORTIVE TREATMENT -> **MCS/INOTROPIC SUPPORT**
4. ASAP **EMB** **in** **FM & COMPLICATED AM**
5. PREVENTION OF IRREVERSIBLE MYOCARDIAL INJURY -> **ACUTE PHASE IMMUNOSUPPRESANTS (? – Still not fully proven the efficacy)**



FROM THE SPOKE TO THE **HUB**
AGGRESSIVE **SUPPORTIVE TREATMENT**

Day 0



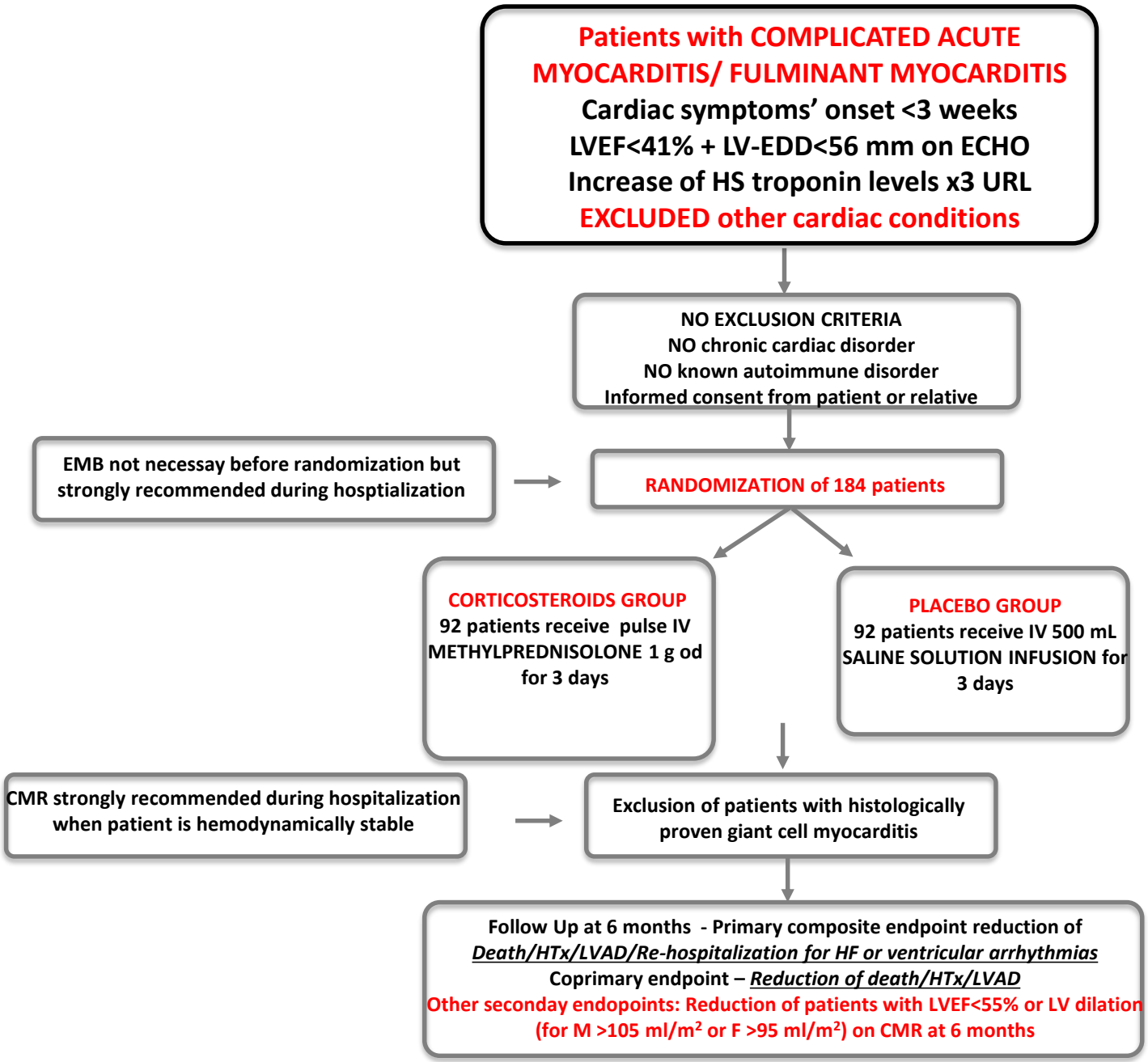


EARLY RECOGNITION!

ASAP EMB in FM & COMPLICATED AM
PREVENTION OF MYOCARDIAL INJURY
ACUTE PHASE IMMUNOSUPPRESSION (?)

RECOVERY

FLOW CHART OF TRIAL TO ASSESS THE EFFICACY OF IV CORTICOSTEROIDS IN COMPLICATED ACUTE MYOCARDITIS/FULMINANT MYOCARDITIS



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enrico.ammirati@ospedaleniguarda.it

SPECIAL THANKS
DE GASPERIS
CARDIO CENTER NIGUARDA

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Dr. GIACOMO VERONESE

University of California San Diego
Dr. Michela Brambatti
Dr. Eric D. Adler

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