

Myocardial infarction with non-obstructive coronary arteries (MINOCA)

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Three and a bit questions

- What is MINOCA?
- How should we investigate it?
- (How should we manage it?)
- What is the prognosis?



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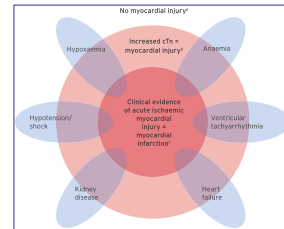
What is MINOCA?

- Easy... or is it?



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What is a heart attack?

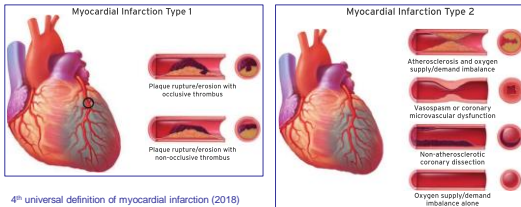


4th universal definition of myocardial infarction (2018)



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Types of heart attack



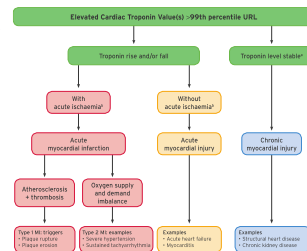
4th universal definition of myocardial infarction (2018)



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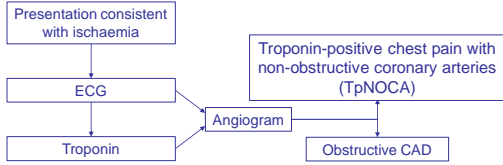
Has my patient had an MI?

4th universal definition of myocardial infarction (2018)



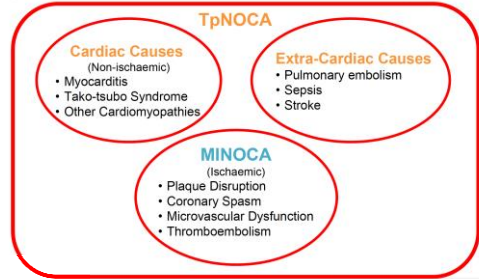
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The real world...



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Troponin Positive Non-Obstructive Coronary Arteries



Adapted from Pasupathy et al (2017) Circ 135: 1490-3



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How should we investigate MINOCA?

[Circulation](#)

AHA SCIENTIFIC STATEMENT

Contemporary Diagnosis and Management of Patients With Myocardial Infarction in the Absence of Obstructive Coronary Artery Disease

Clinical Presentation	Additional Investigation	Diagnosis
Rise and/or fall of cTn with one level ≥ 99 percentile plus ischemic signs/symptoms * Non-obstructive CAD ($\geq 50\%$ lesion on angiography)	Consider Clinical Context (usually event diagnosis)	Alternative Diagnosis - Sepsis - Pulmonary Embolism - Cardiac Contusion - Other Noncardiac TcTn



Circ 2019;139:e891



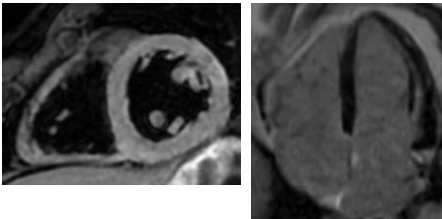
Circ 2019;139:e891



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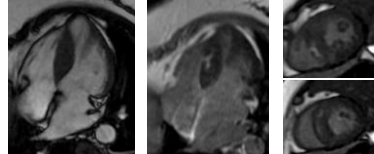
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Myocarditis



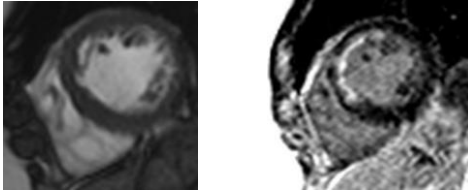
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Cardiomyopathy



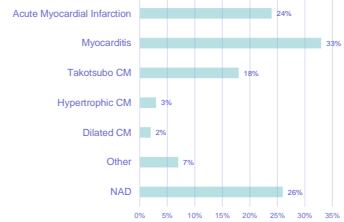
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Myocardial infarction



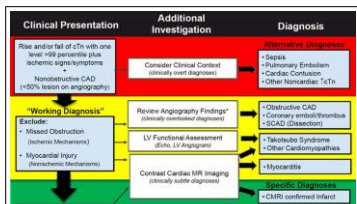
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CMR findings in TpNOCA



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Pasupathy Circ 2015;131:861-870

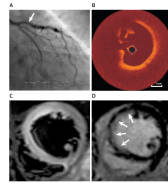


Circ 2019;139:e891



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Coronary vascular imaging



Ruptured fibrous plaque with overlying thrombus

Patients with OCT and CMR (n = 31)
7 Patients (23%) with Ischemic LGE
* 3 patients with plaque disruption or thrombus



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Opolski JACC CV Imaging 2018 in press

What is the prognosis?

Coronary artery disease

ORIGINAL RESEARCH ARTICLE

Outcome after myocardial infarction without obstructive coronary artery disease

Michael J A Williams,¹ Peter R Barz,¹ Mildred Lee,^{2,3} Katrina K Poppe,³ Andrew J Kerr^{1,3}

- ANZACS-QI: 8305 consecutive patients undergoing coronary angiography for MI between over 2 years 2013-2015.
- PREDICT cohort: no prior CVD.
- Non-ACS conditions, stress cardiomyopathy and myocarditis excluded.

Williams MJA, et al. Heart 2019;105:524–530. doi:10.1136/heartjnl-2018-313665



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	MI with obs-CAD (≥50% stenosis)	MI without obs-CAD (MINOCA)	P-value
N	7408	897	
Age (years)	65.1 ± 12.0	63.1 ± 12.5	<0.001
Mean ± SD	66 (56 – 74)	64 (54 – 73)	
Median (IQR)			
Sex			<0.001
Male	5372 (72.5)	410 (45.7)	
Female	2036 (27.5)	487 (54.3)	
Ethnicity, n (%)			<0.001
Māori	764 (10.3)	140 (15.6)	
Pacific	344 (4.6)	38 (4.2)	
Indian	324 (4.4)	22 (2.5)	
Other Asian	209 (2.8)	29 (3.2)	
European/other	5767 (77.8)	668 (74.5)	
Type of ACS, n (%)			<0.001
NSTEMI	4755 (64.2)	807 (90.0)	
STEMI	2653 (35.8)	90 (10.0)	

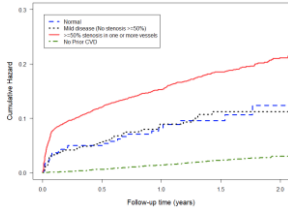


Williams Heart 2019;105:524–530.



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Prognosis



Outcome	No prior CVD	MINOCA	Obstructive CAD
All-cause mortality	2.2	4.9	7.9
CVD death	0.41	0.39	3.6
Non-CVD death	1.9	4.5	4.5
Recurrent non-fatal MI	0.91	7.0	13.6

HEARTOTAGO Williams Heart 2019;105:524-530.

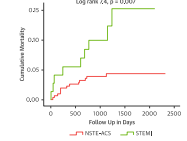


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Prognosis including CMR

- n=388
- Approx 1/4 each:
 - MI/myocarditis/CM/normal
- MRI performed median 37 days
- Median 3.5 years follow-up

STEMI (19%): worse prognosis

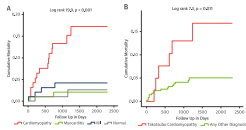


HEARTOTAGO Dastidar Circ CV Imaging 2019;in press

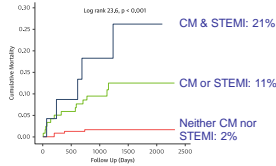


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Cardiomyopathy: worse prognosis



- 43% Takotsubo
- 29% DCM
- 18% HCM



HEARTOTAGO Dastidar Circ CV Imaging 2019;in press



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Conclusions

- Myocardial injury with non-obstructive coronary arteries is a better term
- CMR should be considered in all cases
- Coronary vascular imaging should be considered in some cases
- Prognosis depends on underlying cause, and is worse for cardiomyopathy and STEMI on presentation



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