

# "Management of Coronary Artery Spasm"

*J. C. Kaski and R. Arroyo-Espliguero*

Cardiovascular Biology Research Centre  
Division of Cardiac and Vascular Sciences



*St George's, University of London*

# Prinzmetal's Variant Angina

## Clinical Characteristics of Coronary Artery Spasm

- Typical chest pain at rest (usually nocturnal or early AM)
- Usually, preserved exercise capacity
- Transient ST segment elevation (*prolonged changes can occur*)
- Relieved by GTN (but refractory spasm is not uncommon)

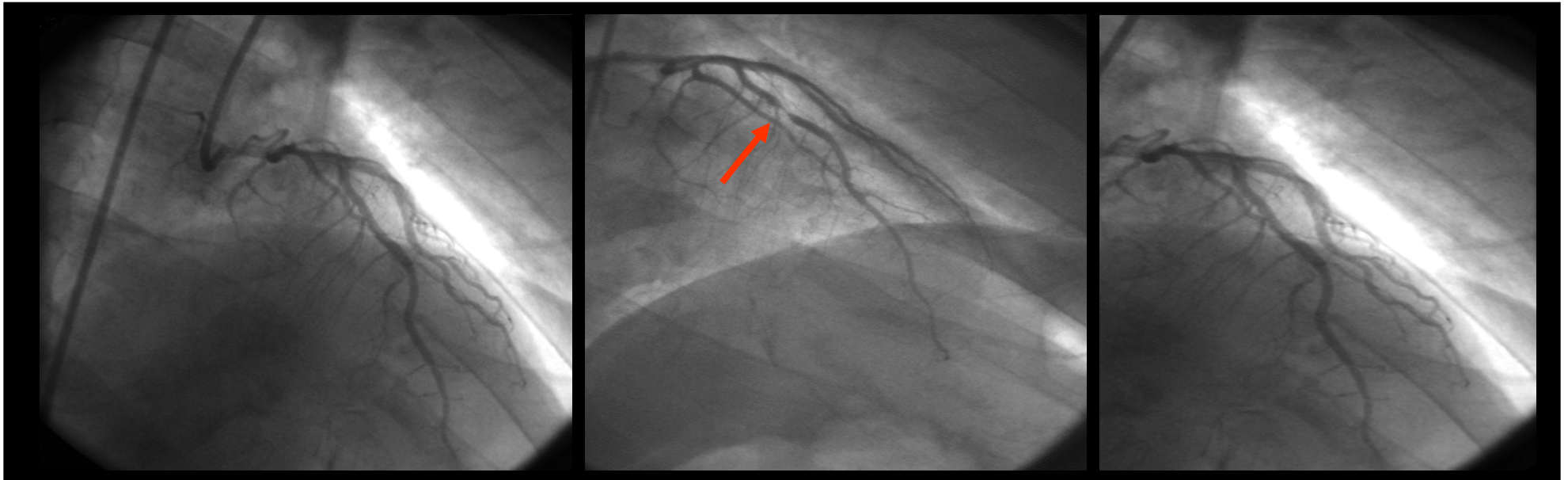


# Coronary Artery Spasm in Variant Angina

Focal spasm leading to total/sub-total coronary artery occlusion

Coronary artery spasm can occur at the site of organic stenoses and in normal arteries

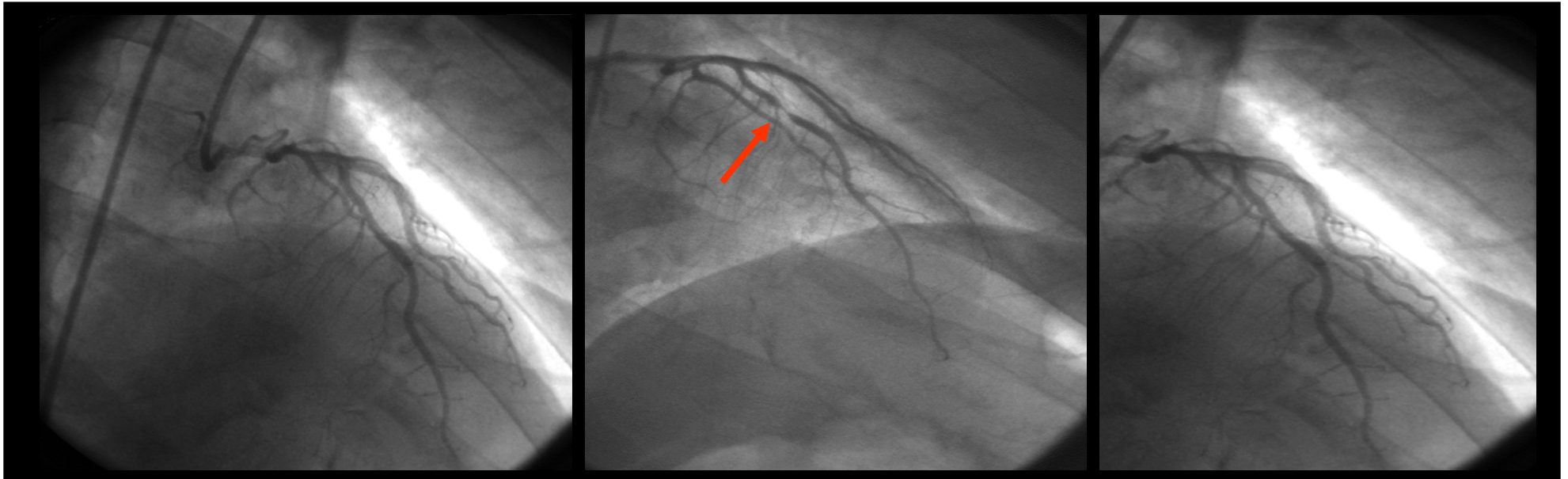
Diffuse (and multivessel) vasospasm more common in Japan



# Coronary Artery Spasm in Variant Angina

Coronary artery spasm in VA is caused by a local hyperreactivity to constrictor stimuli. *Kaski et al. JACC 1989*

Stimuli that trigger spasm are non-specific. *Kaski et al. Circulation 1986*





# Frequency of provoked coronary arterial spasm in 1089 consecutive patients undergoing coronary arteriography

*Bertrand et al: Circulation 65:1299-1306, 1982.*

Focal spasm was uncommon in patients with atypical chest pain (1.2%), effort angina (4.3%), valve heart disease (1.95%) or cardiomyopathy (0%). It occurred most often in patients with angina at rest.

Spasm was provoked (i.v. 0.4 mg ME) in 20% of patients with a recent transmural infarction, but in only 6.2% of patients studied later after MI

# Incidence of induced coronary artery spasm in recent acute transmural myocardial infarction

---

*Lablanche JM, Tilmant PY, Thieuleux FA, Delforge MG, Bertrand ME. Arch Mal Coeur Vaiss. 1983 Feb;76(2):193-202*

---

**Methylergometrine induced spasm in 14 of 55 patients (25%). In the whole population, 27/131 patients (21%) had focal spasm.**

**In 50% of cases the spasm was observed in the "culprit" coronary artery, and in the other 50% spasm developed in a "non-culprit" vessel**

**"Although this study does not confirm that CAS was the cause of MI, it shows that certain degree of coronary artery reactivity is present in patients with a recent MI"**

# Coronary Artery Spasm Frequency

## Patients Undergoing Diagnostic Angiography

**US:** ~ 2-3%

**Italy:** ~ 10%.

**Japan:** 20-30%

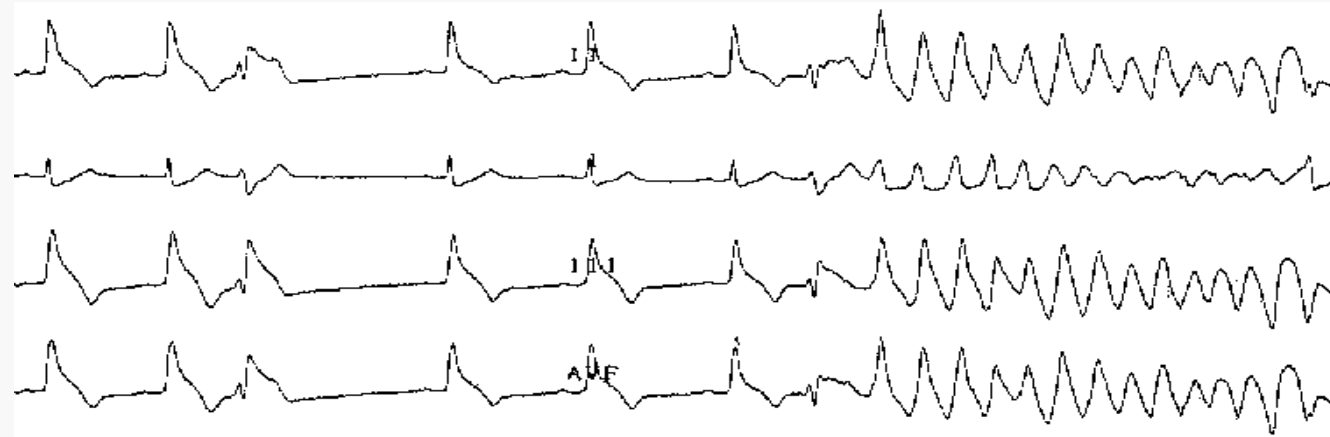
*Of these, 40 % - 80% have normal coronary arteries*

## Patients Admitted with an AMI

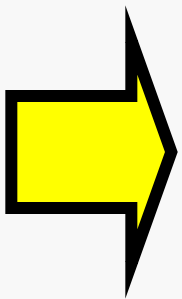
**France:** 15% of all NCA AMI (Da Costa A et al. Eur Heart J 2001)

**Japan:** Spasm provoked (I.C. ergonovine) in 37% of recent MIs and 34% of healed MIs (Sueda S et al. Angiology 2004)

**Coronary artery spasm can cause life-threatening arrhythmias (~15%) and sudden cardiac death (< 5%).**  
*More common in patients with refractory VAP*



**Holter: Transient ST segment elevation followed by polymorphic VT\*\***



# Sudden Cardiac Death in VA Patients

- Cardiac arrest associated with coronary artery spasm.  
*Fellows et al. Am J Cardiol 1987*
- No correlation between fatal arrhythmia and fixed coronary stenoses - *Maseri et al. Am J Cardiol 1987*
- Life-threatening ventricular arrhythmias in patients with silent myocardial ischaemia due to coronary artery spasm.  
*Myerburg et al. N Eng J Med 1992*
- Arrhythmic cardiac arrest due to isolated coronary artery spasm: long-term outcome of 7 resuscitated patients.  
*Chevalier et al. JACC 1998*
- Low prevalence of coronary spasm in patients with normal coronary angiograms and ventricular fibrillation - *Peters et al. Eur Heart J 1998*



# Predictors of Sudden Death in Patients with Variant Angina

Greater baseline QTc dispersion in VA patients with ventricular arrhythmias than in those without ventricular arrhythmias. *Suzuki et al. Circulation 1998*

Higher QT dispersion in patients with cardiac arrest ( $79.4 \pm 17.3$  ms) compared to patients without events ( $56.3 \pm 16.9$  ms) (P= 0.005).

*Parchure et al. Cardiovasc Res. 2001*

Increased QT dispersion may be both a substrate for sudden death and a marker of risk in patients with variant angina. *Parchure et al. EHJ 2000*

# Long Term Follow Up of VA Patients Survivors of Cardiac Arrest

10 variant angina patients with NCA -  
Follow-up: 6.7 years (36 - 167 months)

All treated with high dose CCB - 3 ICD

8 patients remained asymptomatic and 2  
had occasional episodes of coronary spasm

None of the patients suffered a  
recurrence of cardiac arrest or sustained  
/ symptomatic ventricular arrhythmias

# Long Term Follow Up of VA Patients Survivors of Cardiac Arrest

---

10 variant angina patients with NCA,  
survivors of SCD followed for 6.7 years

In the 3 patients with ICD, interrogation  
of the device did not reveal sustained  
ventricular arrhythmias during 83 months  
of follow-up

*Parchure et al. Cardiovasc Res 2001*

**ICD: a therapeutic option for sudden cardiac death secondary to  
severe coronary vasospasm. Fuertes et al. Int J Cardiol. 1998**

**Coronary vasospasm and aborted sudden death treated with an ICD  
and stenting. Fiocca L et al. Italian Heart Journal 2002**

# **Long Term Follow Up of VA Patients Survivors of Cardiac Arrest**

**VA is associated with AMI – Mortality rates are similar to those of MI associated with CAD – Prevention of recurrent MI is needed**

**MI may be prevented in variant angina patients!**

**Large, randomized studies are necessary to assess the role of ICD in VAP. ICD may not be required for long term management in every VA patient who survived SCD, but may be life-saving during the acute period of the disease**

**Treatment should be tailored to the individual**

# Refractory Variant Angina/Coronary Spasm

**Combined therapy** with high dose CCB, nitrates, nicorandil, prazosin, ACEI, fasudil (selective Rho-kinase inhibitor)

**PCI-Stenting** - Useful in selected cases.  
Problems: diffuse and multivessel spasm, spasm in another vessel. (*Tanabe Y et al. JACC 2002*)

**CABG** - Similar advantages & disadvantages

**Intra-aortic balloon pump** - Critically ill patients

**ICD** - Survivors of SCD - Recurrent spasm and life-threatening arrhythmias