

Cardiac arrests at the Cenotaph

MWH Behan, MJ Fenton, B Clapp and M Cooklin

MWH Behan

DM MRCP,
Specialist Registrar
in Cardiology

MJ Fenton

PhD MRCP,
Specialist Registrar
in Cardiology

B Clapp

PhD MRCP,
Consultant
Cardiologist

M Cooklin

MD FRCP,
Consultant Cardiac
Electrophysiologist

Cardiothoracic
Department,
St Thomas'

Hospital, Guy's and
St Thomas' NHS
Trust, London

Clin Med
2006;6:612-3

ABSTRACT – This report describes the case histories of three veterans who suffered cardiac arrests at the 2005 Cenotaph Remembrance Parade. All three were successfully resuscitated and admitted to the St Thomas' Hospital Coronary Care Unit. They had internal cardioverter defibrillators (ICDs) inserted and remain well. All three plan to attend Remembrance ceremonies this year. We review the evidence between emotional stress and arrhythmias and the updated National Institute for Health and Clinical Excellence (NICE) guidelines for ICDs.

On Remembrance Sunday 2005, three elderly ex-servicemen were admitted to the St Thomas' Coronary Care Unit having suffered cardiac arrests while on parade at the Cenotaph in Whitehall. They all admitted to intense feelings of pride, sorrow and nostalgia on the morning of the ceremony. We present their case histories (Table 1) and a brief review on the evidence for stress-induced ventricular arrhythmias.

Patient One is a 76-year-old veteran of the Suez Crisis, who collapsed due to ventricular fibrillation (VF) whilst standing at the Cenotaph. He was resuscitated by paramedics and brought to the Intensive Care Unit. Angiography demonstrated a tight proximal left anterior descending artery (LAD), stenosis and diffuse small vessel disease not amenable to revascularisation. Following successful stenting of the LAD he received an implantable cardioverter defibrillator (ICD).

Patient Two is an 80-year-old Fleet Air Arm mechanic who served in the Indian Ocean during the

Second World War, and who also presented with a VF arrest. He had seven minutes of bystander resuscitation before cardioversion by paramedics. Angiography demonstrated a severely calcified LAD, circumflex and right coronary artery for which revascularisation was not felt possible and he received an ICD.

Patient Three is a 79-year-old Royal Air Force mechanic who served in the Far East during the Second World War, and who also suffered a VF arrest requiring paramedic resuscitation. Seven years earlier he underwent aortic valve replacement and coronary artery bypass grafting. Coronary angiography showed a blocked left internal mammary artery graft, with a patent graft to his obtuse marginal in a left dominant system. He went on to stenting of his native LAD and implantation of an ICD.

Discussion

Emotional stress has been associated with life-threatening ventricular arrhythmias. In an early study of 62 patients who had survived cardiac arrest and 55 patients with symptomatic ventricular tachycardia (VT), 25 reported having experienced an acute emotional disturbance in the 24 hours preceding their arrhythmia.¹ More recently, 24-hour Holter monitoring of a population of nearly 500 patients has confirmed emotional upset as an independent predictor of VT.² Epidemiological studies support an association between emotional stress and sudden cardiac death. During a missile attack a sharp rise in the incidence of myocardial infarction (MI) and sudden cardiac death (SCD) among civilians was noted by a

Table 1. Summary of case histories.

	Age/Sex	Conflict	ECG	Troponin	Echo	Angiography	Outcome
1	76 M	Suez	T wave changes	0.16 ng/ml	EF 65%	LAD stenosis Small vessel disease	LAD PCI ETT+ve ICD
2	80 M	WW II	T wave changes	0.19 ng/ml	EF 20%	Calcified LAD/Cx/ RCA	ICD
3	79 M	WW II	LBBB	0.24 ng/ml	EF 20%	Blocked LIMA LAD stenosis Patent SVG to OM	LAD PCI ICD

Cx = circumflex artery, EF = ejection fraction, ETT = exercise tolerance test, ICD = implantable cardioverter defibrillator, LAD = left anterior descending artery, LBBB= left bundle branch block, LIMA = left internal mammary artery, LV = left ventricle, OM = obtuse marginal artery, PCI = percutaneous coronary intervention, RCA = right coronary artery, SVG = saphenous vein graft.

Tel Aviv hospital.³ Similarly, on the day of the Los Angeles earthquake in January 1994, the incidence of SCD rose from a daily mean of 4.6 deaths in the week before the earthquake to 24 deaths on that day alone.⁴

In addition to emotional stress predisposing to MI, there is evidence that it can promote arrhythmias in the absence of ischaemia. The indirect evidence has been reviewed previously:⁵ in employed patients with ICDs, VT occurs most frequently on Mondays;⁶ medical interns show increased ventricular ectopy and non-sustained arrhythmias while on call⁷ and VT is easier to induce, and is accelerated, in the context of psychological stress.⁸ Direct evidence of a causative link has been obtained from subjects with ICDs. Forty-two patients filled in mood diaries for the 15 minutes before therapeutic ICD discharges and for another 15-minute period one week later.⁵ High anger scores preceded 15% of ventricular arrhythmias but were recorded in only 3% of control periods. Other mood states were not significantly correlated with ICD discharges. Various mechanisms may mediate the effect of emotion on ventricular arrhythmias. Repolarisation abnormalities occur in the electrocardiograms (ECGs) of hospital interns when woken by alarm calls,⁹ while T-wave alternans, a marker of repolarisation heterogeneity

correlated with the risk of arrhythmia, increases with the induction of an anger-like state in dogs.¹⁰

Conclusion

The patients described in this report were elderly men with ischaemic heart disease who were under emotional stress on the day of their cardiac arrest. They had small troponin rises but had not described chest pain prior to cardiac arrest; nor had they experienced specific ischaemic ECG changes. The National Institute for Health and Clinical Excellence recently issued a review and reappraisal of its original guidelines for the primary and secondary prevention of SCD which were published in 2000 (Box 1).¹¹ All three patients qualify for secondary prevention of SCD.

As young men, our three patients endured the physical and psychological hardships of warfare. As elderly veterans the psychological stress associated with Remembrance Sunday may have been partly responsible for their arrhythmias. With their ICDs in place all three intend to attend Remembrance ceremonies in 2006.

Box 1. National Institute for Health and Clinical Excellence guidelines regarding implantable cardioverter defibrillators (ICDs) for arrhythmias.¹¹

ICDs are recommended for patients in the following categories.

A. Secondary prevention,* that is for patients who present, in the absence of a treatable cause, with one of the following:

- having survived a cardiac arrest due to VT or VF
- spontaneous sustained VT causing syncope or significant haemodynamic compromise
- sustained VT (without syncope/cardiac arrest), with an ejection fraction (EF<35%) (no worse than class III of the NYHA functional classification of heart failure).

B. Primary prevention,** that is for patients who have:

- a history of previous (more than four weeks) MI and:
 - either
 - LVEF<35% and no worse than NYHA class III, and
 - non-sustained VT on Holter monitoring, and
 - inducible VT on EP testing
 - or
 - LVEF<30% and no worse than NYHA class III and
 - QRS duration of equal to or more than 120 milliseconds
- familial conditions with a high risk of sudden death including long QT syndrome, hypertrophic cardiomyopathy, Brugada syndrome or ARVD, or following repair of congenital heart disease.

ARVD = arrhythmogenic right ventricular dysplasia, ECG = electrocardiogram, EF = ejection fraction, EP = electrophysiological, ICDs = implantable cardioverter defibrillators, MI = myocardial infarction, NYHA = New York Heart Association, VF = ventricular fibrillation, VT = ventricular tachycardia.

*Secondary prevention of sudden cardiac death (SCD) is defined as the prevention of an additional life-threatening event in survivors of sudden cardiac events or in patients with recurrent unstable rhythms. **Primary prevention of SCD is defined as prevention of a first life-threatening event.

References

- 1 Reich P, DeSilva RA, Lown B, Murawski BJ. Acute psychological disturbances preceding life-threatening arrhythmias. *JAMA* 1981;246:233–5.
- 2 Culic V, Eterovic D, Miric D *et al*. Triggering of ventricular tachycardia by meteorological and emotional stress: protective effect of beta-blockers and anxiolytics in men and elderly. *Am J Epidemiol* 2004; 160: 1047–58.
- 3 Meisel SR, Kutz I, Dayan KI *et al*. Effect of Iraqi missile war on incidence of acute myocardial infarction and sudden death in Israeli civilians. *Lancet* 1991;338:660–1.
- 4 Leor J, Poole WK, Kloner RA. Sudden cardiac death triggered by an earthquake. *N Engl J Med* 1996;334:413–19.
- 5 Lampert R, Joska T, Burg MM *et al*. Emotional and physical precipitants of ventricular arrhythmia. *Circulation* 2002;106:1800–5.
- 6 Peters RW, McQuillan S, Resnick RK, Gold MR. Increased Monday incidence of life-threatening ventricular arrhythmias. *Circulation* 1996;94: 1346–9.
- 7 Stamler JS, Goldman ME, Gomes J, Matza D, Horowitz SF. The effect of stress and fatigue on cardiac rhythm in medical interns. *J Electrocardiol* 1992;25:333–8.
- 8 Lampert R, Jain D, Burg MM, Batsford WP, McPherson CA. Destabilizing effects of mental stress on ventricular arrhythmias in patients with implantable cardioverter-defibrillators. *Circulation* 2000; 101:158–64.
- 9 Toivonen L, Helenius K, Viitasalo M. Electrocardiographic repolarization during stress from awakening on alarm call. *J Am Coll Cardiol* 1997;30:774–9.
- 10 Kovach J, Nearing B, Verrier R. Angerlike behavioural state potentiates myocardial ischemia-induced T-wave alternans in canines. *J Am Coll Cardiol* 2001;37:1719–25.
- 11 National Institute for Health and Clinical Excellence. *Implantable cardioverter defibrillators for arrhythmias*. London: NICE, 2006. www.nice.org.uk/TA095guidance