



Incessant Ventricular Tachycardia Acutely Controlled with Off-Pump Coronary Artery Bypass Surgery and Aneurysmal Plication

Alireza Heydari, MD, Asadollah Mirzaie, MD, Mohammad Tayyebi, MD*

Ghaem University Hospital, Mashhad University of Medical Sciences, Mashhad, Iran.

Received 29 May 2009; Accepted 26 October 2009

Abstract

There are many treatment modalities available to acutely terminate incessant ventricular tachycardia with variable success rates, but some cases tend to prove refractory to all of them. We report a 59-year-old woman presenting with incessant ventricular tachycardia. Echocardiography revealed a large true apical aneurysm and severe left ventricular dysfunction. The arrhythmia was controlled in the operating room after off-pump coronary artery bypass surgery and plication of the apical aneurysm.

J Teh Univ Heart Ctr 4 (2010) 205-208

Keywords: Tachycardia, ventricular • Heart aneurysm • Coronary artery bypass, off-pump

Introduction

Incessant ventricular tachycardia (VT) occurs infrequently, especially in patients with large post-infarction ventricular aneurysm and severe left ventricular (LV) systolic dysfunction.^{1,2} Antiarrhythmic drugs are generally ineffective, and the use of an implantable cardioverter/defibrillator (ICD) is contraindicated;¹ management is, therefore, challenging because of the resistance of the arrhythmia to treatment with antiarrhythmic drugs and repeated external cardioversions.^{1,2} Incessant VT can also prove life-threatening not only through the arrhythmia per se but also through possible myocardial depression and vasodilatation triggered by the administration of antiarrhythmic drugs in that acute setting.³ As a result, therapeutic options must be aimed at the arrhythmia substrate.

We herein report the case of a patient presenting with incessant VT terminated only by off-pump coronary artery bypass grafting (CABG) with aneurysmal plication.

Case report

A 59-year-old woman referred to our institute because of incessant wide QRS tachycardia unresponsive to 3 antiarrhythmic drugs. Also, repeated synchronized electrical cardioversions were followed by wide QRS tachycardia in a few seconds. Physical examination showed normal blood pressure of 100/70 mmHg, pulse rate of 150 per minute, and respiratory rate of 18 per minute. Lungs were clear, and there was S3 gallop and a systolic murmur at the apex.

She had suffered an anterior myocardial infarction 5 months previously and had been admitted several times in the previous 3 months because of palpitation.

Laboratory findings, including cardiac enzymes, were normal; electrocardiogram showed a wide QRS complex tachycardia indicative of VT (Figure 1); echocardiography revealed a large apical true aneurysm with severely reduced LV function (Figure 2A); and finally coronary angiography demonstrated significant stenosis in the left anterior

*Corresponding Author: Mohammad Tayyebi, Department of Cardiology, Ghaem University Hospital, Mashhad University of Medical Sciences, Ahmabad Avenue, Mashhad, Iran. 9176699199. P.O. Box: 155, Tel: +98 511 8012739. Fax: +98 511 8430492. E-mail: Tayyebim@mums.ac.ir.



Figure 1. Standard 12-lead surface electrocardiogram of the patient at presentation showing wide QRS complex tachycardia with right bundle-branch block morphology, superior left-axis deviation, 130 milliseconds of QRS width and evidence of ventriculoatrial dissociation. Arrows point to P-waves dissociated from QRS complexes

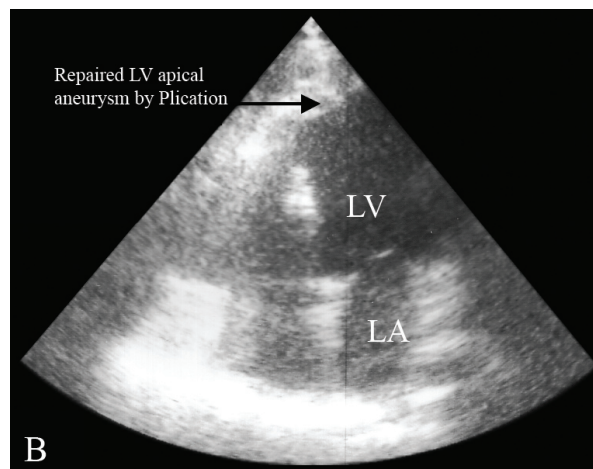
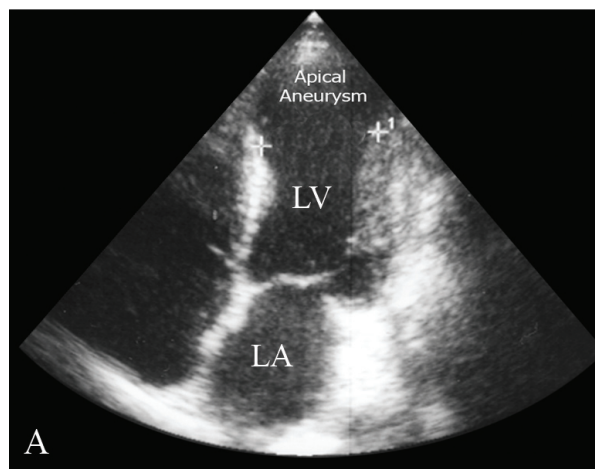


Figure 2. A. Preoperative echocardiography of the patient in the apical four-chamber view depicting the left ventricular apical aneurysm. B. Postoperative echocardiography in the same view showing elimination of the aneurysm after surgical plication
LA, Left atrium; LV, Left ventricle

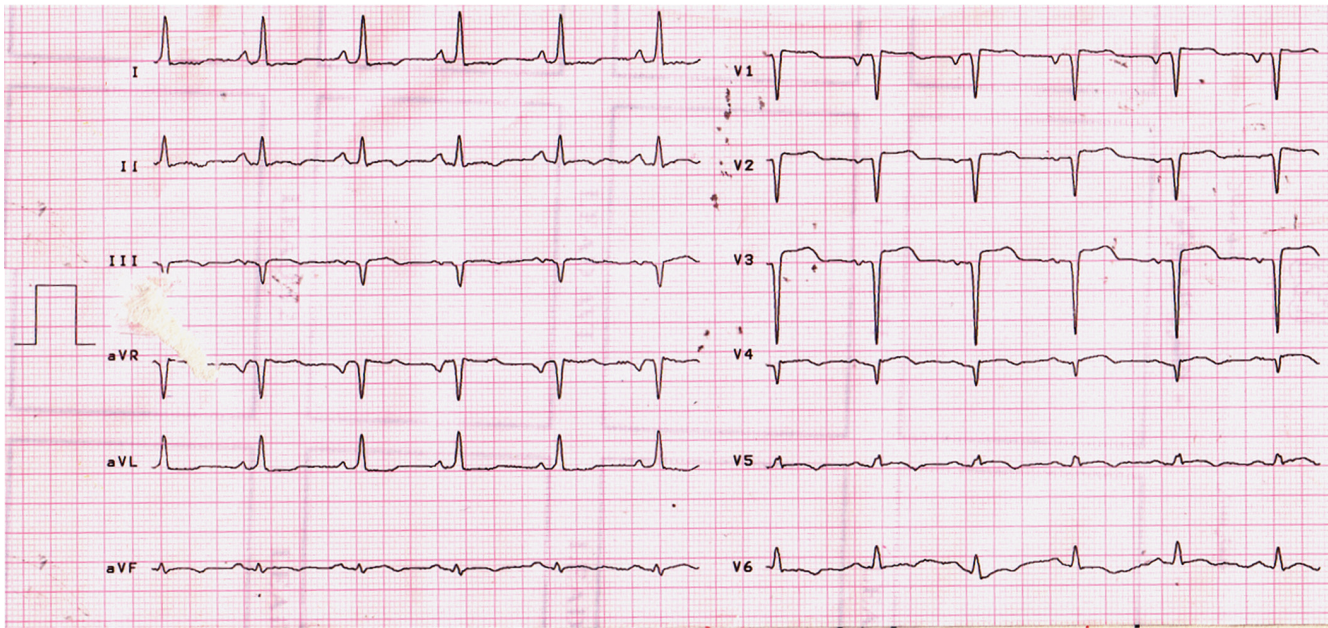


Figure 3. Standard 12-lead surface electrocardiogram of the patient after surgery showing normal sinus rhythm and old anterior myocardial infarction as evidenced by Q-waves in precordial leads of V1-V4

descending artery and diagonal arteries.

The patient emergently underwent off-pump CABG with the plication of the aneurysm (Figure 2B), upon which sinus rhythm spontaneously emerged and was maintained in the operating room (Figure 3). A single-chamber implantable cardioverter defibrillator (ICD) was thereafter implanted, and the patient was discharged after one week. At 39 months' follow-up without any antiarrhythmic drugs, there was no episode of palpitation, syncope, presyncope, or appropriate therapy by ICD.

Discussion

Ventricular tachycardia that repeatedly recurs and persists for more than half of a 24-hour period despite repeated attempts to terminate the arrhythmia is designated "incessant."³ This type of VT is a therapeutic challenge in that antiarrhythmic agents can cause myocardial depression or vasodilatation, thus aggravating the condition.⁴ Such medications might even facilitate the incessant mechanism itself by slowing cardiac conduction. Moreover, they can initiate torsades de pointes and subsequent hemodynamic compromise.

Use of an ICD is also ineffective. Indeed, because an ICD delivers multiple shocks and does not prevent recurrences, its use is contraindicated as a sole therapeutic option.⁵ Rarely, idiopathic VT that is not associated with structural heart disease is incessant.⁶ More commonly, incessant VT is due to structural heart disease, with severe, immediate consequences.³

Sedation and measures to reduce sympathetic tone are

important, and often effective.⁷ If episodes of arrhythmia are not precipitated by slow heart rates or pauses, the administration of beta-adrenergic blockers should be considered. General anesthesia quiets episodes and restores stability in some cases. Intra-aortic balloon counter-pulsation can also be helpful.⁸

The treatment of choice for incessant tachyarrhythmia is direct intervention to alter the substrate. The available options are radiofrequency catheter ablation or ablative surgery. Catheter ablation is an important option for the management of incessant monomorphic VT and can be life-saving.⁹ When hemodynamic stability can be maintained, the presence of the tachycardia facilitates mapping to identify the source of the arrhythmia. Most scar-related reentry circuits in patients with prior myocardial infarction are located on the endocardium and are susceptible to catheter ablation from an intravascular, endocardial approach.¹⁰ Even after successful radiofrequency ablation, the use of an ICD is generally advisable because the recurrence of the arrhythmia is a frequent occurrence.¹¹ Surgical ablation has also been reported by either subendocardial resection or cryoablation. Sometimes this procedure may be accompanied by aneurysmectomy or endoaneurysmorrhaphy.¹² Both percutaneous and surgical ablation approaches are invasive and time-consuming procedures not available in all hospitals, with a moderate success rate even in experienced hands. They have important technical challenges and possible complications. The use of an epicardial or subselective transcatheter injection of alcohol is another possible intervention, but it might not be useful in some cases because of anatomic limitations.¹³

We herein present a patient with incessant VT refractory

to antiarrhythmic drugs and electrical cardioversion. There are reports in the existing literature on the use of aneurysmal plication as a surgical technique for the remodeling of the LV cavity; to our knowledge, however, there is no report to date on the utilization of this treatment technique to treat the incessant VT. Of course, we should not ignore the role of CABG in controlling the ischemia as the triggering factor for initiating the tachycardia. Another explanation for the control of the tachycardia postoperatively in this patient may be simply the time-dependent elimination of the proarrhythmic effect of the prescribed drugs that prominently slow conduction velocity. Be that as it may, the non-recurrence of the arrhythmia at a long-term follow-up is in favor of the causal effect of surgery in changing the electrophysiological properties of the arrhythmic substrate. Obviously, success is not guaranteed with this intervention modality as is the case with others; nonetheless, given the life-threatening nature of some cases of incessant VT, we would posit that when percutaneous and surgical ablations are not available and once antiarrhythmic drugs or electrical cardioversion have failed, there may be an opportunity to control the arrhythmia in the operating room after off-pump CABG and plication of the apical aneurysm. It is also deserving of note that the presence of acute coronary syndrome necessitates coronary revascularization as well.

Conclusion

Acute management of patients with incessant VT is often a challenging problem. Off-pump left ventricular aneurysmal plication and, if indicated, CABG after selective coronary angiography could be an option when the arrhythmia is refractory to antiarrhythmic drugs and electrical cardioversions and other interventions fail or are not technically available.

References

1. Afshar H, Rasekh A, Treistman B, Van Leeuwen C, Duncan JM, Massumi A. Cryoablation of incessant ventricular tachycardia: case report and long-term follow-up. *Tex Heart Inst J* 2000;27:52-54.
2. Arias MA, Peinado R, Sánchez AM, Merino JL. Incessant ventricular tachycardia acutely controlled with intracoronary injection of radiographic contrast media. *Am J Emerg Med* 2006;24:290-292.
3. Stevenson WG, Soejima K. Inside or out? Another option for incessant ventricular tachycardia. *J Am Coll Cardiol* 2003;41:2044-2045.
4. Jordaens LJ. Incessant ventricular tachycardia: a lost case or new hope? *Eur Heart J* 1996;17:647-648.
5. GURSOY S, NELLENS P, GUIRAUDON G, BRUGADA J, BRUGADA P. Epicardial and subselective transcatheter chemical ablation of incessant ventricular tachycardia. *Cathet Cardiovasc Diagn* 1993;28:323-327.
6. Lerman BB, Stein K, Engelstein ED, Battleman DS, Lippman N, Bei D, Catanzaro D. Mechanism of repetitive monomorphic

- ventricular tachycardia. *Circulation* 1995;92:421-429.
7. Nademanee K, Taylor R, Bailey WE, Rieders DE, Kosar EM. Treating electrical storm: sympathetic blockade versus advanced cardiac life support-guided therapy. *Circulation* 2000;102:742-747.
8. Fotopoulos GD, Mason MJ, Walker S, Jepson NS, Patel DJ, Mitchell AG, Ilesley CD, Paul VE. Stabilization of medically refractory ventricular arrhythmia by intra-aortic balloon counterpulsation. *Heart* 1999;82:96-100.
9. Soejima K, Suzuki M, Maisel WH, Brunckhorst CB, Delacretaz E, Blier L, Tung S, Khan H, Stevenson WG. Catheter ablation in patients with multiple and unstable ventricular tachycardias after myocardial infarction: short ablation lines guided by reentry circuit isthmuses and sinus rhythm mapping. *Circulation* 2001;104:664-669.
10. Stevenson WG, Friedman PL, Sager PT, Saxon LA, Kocovic D, Harada T, Wiener I, Khan H. Exploring postinfarction reentrant ventricular tachycardia with entrainment mapping. *J Am Coll Cardiol* 1997;29:1180-1189.
11. Cao K, Gonska BD. Catheter ablation of incessant ventricular tachycardia: acute and long-term results. *Eur Heart J* 1996;17:756-763.
12. Wellens F, Geelen P, Demirsoy E, Van Praet F, De Geest R, Degrieck I, Vanermen H, Brugada P. Surgical treatment of tachyarrhythmias due to postinfarction left ventricular aneurysm with endoaneurysmorrhaphy and cryoablation. *Eur J Cardiothorac Surg* 2002;22:771-776.
13. GURSOY S, NELLENS P, GUIRAUDON G, BRUGADA J, BRUGADA P. Epicardial and subselective transcatheter chemical ablation of incessant ventricular tachycardia. *Catheter Cardiovasc Diagn* 1993;28:323-327.