

A Case of Recurrent Palpitations in an Elderly Woman with Breast Cancer: Management of Recalcitrant Svt in the Emergency Department

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Abstract

Supraventricular tachycardia encompasses a group of cardiac rhythm disturbances characterised by a rapid heart rate, which arise from impulses originating above the bundle of His. This condition affects patients across all age groups and is a common occurrence in the emergency setting. We present the case of a 69-year-old woman with a history of breast carcinoma, hypertension and hyperlipidaemia, who presented to the emergency department with recurrent palpitations which were confirmed on electrocardiogram to be the result of supraventricular tachycardia. The management of recalcitrant supraventricular tachycardia in the emergency setting, including techniques described in recent literature, as well as special considerations for the elderly and oncological patients in the acute setting will be discussed.

Key words: supraventricular tachycardia; left bundle branch block; adenosine; AVNRT

Introduction

Supraventricular tachycardia (SVT) refers to cardiac rhythm disturbances characterised by a rapid heart rate (greater than 100 beats per minute), attributed to electrical impulses which originate from and are propagated by atrial or atrioventricular nodal tissue proximal to the bundle of His. This condition arises due to re-entry phenomena or automaticity at or above the atrioventricular node, which results in a rapid ventricular response when impulses are transmitted down the bundle of His [1]. By definition, SVT encompasses a variety of tachyarrhythmias arising above the bundle of His. In practice, however, SVT commonly refers to atrioventricular nodal re-entry tachycardia (AVNRT), atrioventricular re-entry tachycardia (AVRT) and atrial tachycardia. SVT is a relatively common occurrence in the emergency department. This article will provide an overview of the management of recalcitrant SVT in the emergency setting, including various techniques described in recent literature, as well as the effects of age and malignancy on the acute management of SVT.

Case report

A 69-year-old woman with a history of metastatic spindle cell carcinoma of the breast, hypertension and hyperlipidaemia presented to the emergency department with sudden-onset palpitations, associated with lightheadedness, breathlessness and slight chest discomfort. She denied

any previous episodes of palpitations, recent caffeine or alcohol intake and had no history of cardiac or thyroid disease. Her last chemotherapy session was 10 days ago. On examination, she was afebrile and had a blood pressure of 100/68 mmHg. Her respiratory rate was 19 breaths per minute with 99% oxygen saturation on room air. Her heart rhythm was regular with no murmurs or gallop. Her jugular venous pressure was normal and there was no lower limb oedema. Auscultation of her lungs, however, revealed decreased air entry on the left. A 12-lead electrocardiogram (ECG) performed in the emergency department demonstrated regular, narrow-complex tachycardia at a rate of 188 beats per minute with absent P waves, consistent with a diagnosis of SVT (Fig 1A). Vagal manoeuvres were unsuccessful and she was given a rapid intravenous bolus consisting of 6mg adenosine, which resulted in conversion to sinus rhythm with a left bundle branch block (LBBB) pattern (Fig 1B). Her symptoms recurred 30 minutes later and her ECG rhythm strip confirmed a recurrence of SVT, necessitating a repeat dose of adenosine, administered as a 12mg intravenous bolus. The second dose of adenosine aborted the arrhythmia, however, the patient again complained of palpitations shortly after. As she remained haemodynamically stable, a decision was made for an infusion of diltiazem, following which, there was conversion to sinus rhythm with the same LBBB pattern. 2 hours later, her ECG showed another recurrence of SVT and she was given a repeat infusion of diltiazem. Review of the patient's serum biochemistry showed potassium of 3.5mmol/l (reference

3.6-5mmol/l), magnesium of 0.75mmol/l (reference 0.74-0.97mmol/l) and calcium of 2.03mmol/l (reference 2.09-2.46mmol/l). Her full blood count showed a white blood cell count of $6.27 \times 10^9/L$ (reference 4.0-10.0 $\times 10^9/L$), platelets of $288 \times 10^9/L$ (reference 140-440 $\times 10^9/L$), haematocrit of 35% (reference 36-46%) and haemoglobin of 11.6 g/dl (reference 12.0-16.0g/dl). A chest X-ray was performed which revealed the presence of a moderately-sized left-sided pleural effusion. Thereafter, the patient was admitted for further management. She was subsequently

found to have developed a left lung collapse with pleural effusion, secondary to tumour invasion of the left main bronchus, for which she underwent rigid bronchoscopy and stenting. Evaluation of her cardiac telemetry revealed features of pre-excitation consistent with a Wolff-Parkinson-White ECG pattern. Electrophysiologic studies demonstrated orthodromic AVRT and ablation of the right free wall accessory pathway was performed successfully with no complications.

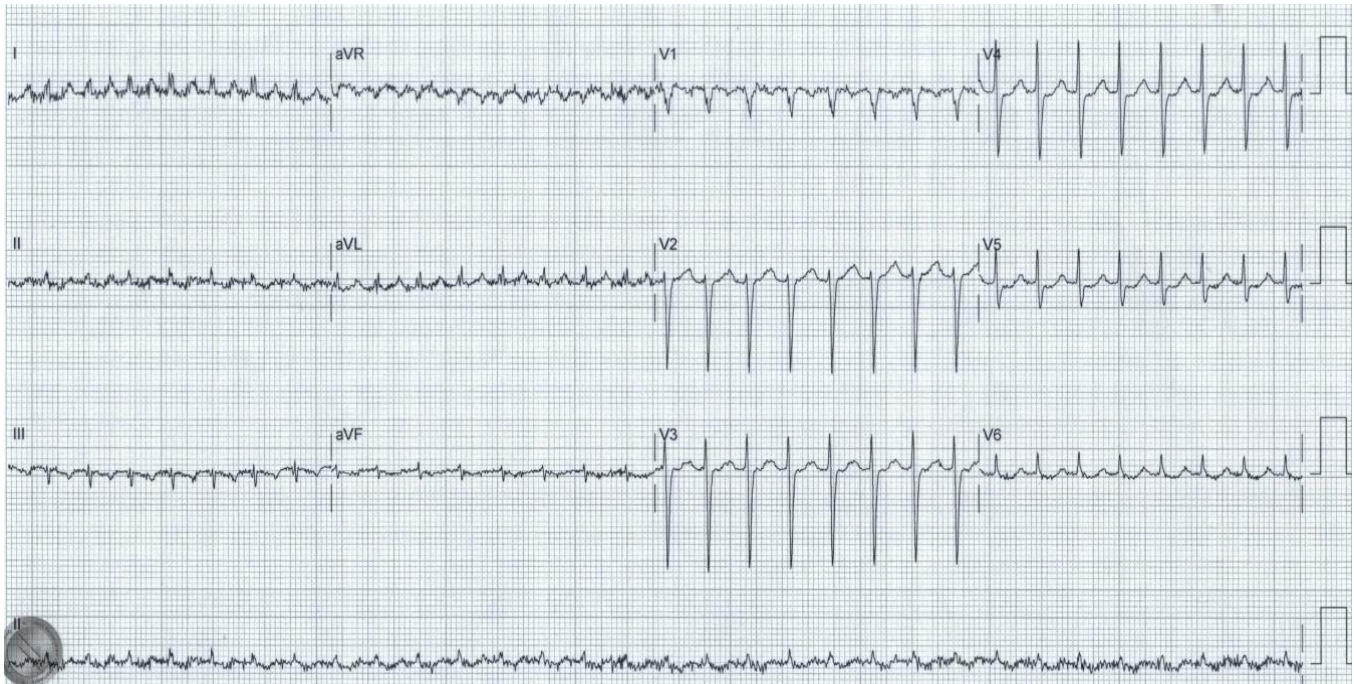


Figure 1A: ECG on arrival at the emergency department showing regular narrow-complex tachycardia at a rate of 188 beats per minute, consistent with a diagnosis of supraventricular tachycardia



Figure 1B: ECG after administration of 6mg adenosine showing conversion to sinus rhythm with a left bundle branch block pattern

Discussion

Management of recalcitrant supraventricular tachycardia in the emergency department:

Current practice

The first step in the management of SVT entails an assessment of the patient's vital signs. Haemodynamically unstable patients with SVT should undergo immediate direct current (DC) cardioversion beginning at 50J, as per Advanced Cardiac Life Support (ACLS) guidelines. Otherwise, attempts may be made to abort the tachyarrhythmia with vagal manoeuvres. Various techniques have been described in the literature, such as carotid massage, bearing down, coughing, gagging and even immersing the face in cold water [2]. Adenosine is the drug of choice if vagal manoeuvres fail to terminate SVT and should be administered as a rapid intravenous bolus with an initial dose of 6 mg. A repeat dose at 12 mg of adenosine may be administered should the tachycardia persist. Adenosine has a negative chronotropic effect on the heart as it prolongs atrioventricular nodal conduction. Its rapid onset of action and short half-life of less than 10s makes it an effective first-line pharmacologic agent in the management of SVT. Of note, methylxanthines (i.e. caffeine and theophylline) antagonise the effects of adenosine via competitive binding at the purinergic receptor. In addition, adenosine should be avoided in patients with a history of asthma and second or third degree atrioventricular block. In patients receiving carbamazepine, the initial dose of adenosine should be reduced by half due to an increased risk of heart block [3]. Adenosine should always be administered under monitoring of vital signs and a defibrillator should be present on site. If adenosine fails, calcium channel blockers such as verapamil and diltiazem may be administered as an infusion. Like adenosine, non-dihydropyridine calcium channel blockers increase the refractory period and slow atrioventricular nodal conduction and may be used in the acute management of recalcitrant SVT [4].

Newer techniques described in recent literature

An interesting case report published in 1991 described the successful employment of a nasogastric tube to terminate SVT when other vagal manoeuvres had failed [5]. This method worked due to stimulation of the larynx and epiglottis which are areas supplied by the vagus nerve. Over the past few years, several studies have been performed to evaluate the efficacy of the various treatment options available for recalcitrant SVT in the emergency setting. Recent literature has reported the successful use of high dose adenosine (up to 36mg) in the acute management of refractory SVT [6]. Calcium channel blockers have been shown to be as efficacious as adenosine in the treatment of SVT and may be useful for refractory AVNRT [7]. Beta blockers have been evaluated but were found to have a lower conversion rate and a higher risk of hypotension compared to calcium channel blockers [8]. Although not specifically described for recalcitrant SVT, modified Valsalva manoeuvres including the upside-down position [9], as well as forced expiration into a syringe while in the Trendelenburg position have been described to terminate SVT with increased success rates as compared to traditional vagal manoeuvres (43% vs 17%) [10]. Novel techniques such as the use of handstands have also been reported as a simple, non-invasive technique in the treatment of SVT in the paediatric population [11].

Our case is compelling because it describes the occurrence of SVT in two unique contexts: (1) old age and (2) malignancy; the implications of which will be further discussed regarding management of SVT in the emergency department.

Supraventricular tachycardia in the elderly

Although SVT is a tachyarrhythmia which occurs more frequently among younger patients, no age is spared and this arrhythmia is not uncommonly

encountered in elderly patients presenting to the emergency department. Although the steps in the acute management of SVT in the elderly are largely similar to that of the younger patient population, there are some notable differences:

1. Unlike the young, elderly patients tend to be more symptomatic and more frequently require emergency treatment including urgent hospital admissions. A study published by Epstein et al. reported that SVT, although well-tolerated in young patients, is more likely to be associated with incapacitating symptoms and may be potentially life-threatening in the elderly [12].
2. Tachycardia tends to be persistent and recurrent in the elderly, which may result in dilated cardiomyopathy and congestive cardiac failure [13].
3. Arrhythmias such as SVT are a considerable cause of falls, disability and frequent admissions to hospital in the elderly [14]. This group of patients are also more likely to present with syncope or presyncope; a high degree of suspicion is required for early recognition and institution of urgent treatment [15].
4. Elderly patients are more vulnerable to the undesired side effects of antiarrhythmic medications, such as orthostatic hypotension, bradycardia, urinary retention, and falls [16]. In addition, antiarrhythmic drugs are less well-tolerated in this group of patients and may be associated with a higher incidence of toxicity [17]. Caution should be undertaken in the prescription of these drugs to elderly patients.
5. With regard to vagal manoeuvres, caution is advised in the consideration of carotid sinus massage in the elderly – even in patients without an audible bruit – due to the risk of carotid atheroembolism and stroke [18].

Supraventricular tachycardia and malignancy

The most frequently encountered arrhythmia in oncology patients is SVT. Arrhythmias in this group of patients may occur due to a variety of reasons. Causes reported in the literature include primary or secondary cardiac tumours, pericardial constriction, cardiomyopathy secondary to chemotherapy, increased sympathetic states and metabolic derangements. In addition, certain anti-tumour drugs may be potentially arrhythmogenic; examples include anthracyclines, fluorouracil and gemcitabine. SVT occurring in a background of malignancy is often challenging to abort with pharmacological therapy alone. In such situations, synchronised cardioversion must be considered early [19].

Conclusion

Supraventricular tachycardia is a common occurrence in the emergency department, with affected patients spanning all age groups. Emergency physicians should be familiar with the acute management of supraventricular tachycardia, with special considerations made for the elderly, as well as patients with a known background of malignancy, in whom supraventricular tachycardia may be recalcitrant and less well-tolerated. Early recognition of this condition and the institution of urgent treatment is crucial in avoiding potential complications.

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