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Abstract

Background: We described a 75-year-old man with a history of recurrent attacks of paroxysmal supraventricular tachycardia (PSVT). The patient presented to the emergency department (ED) with complaints of palpitations and chest tightness. Vagal stimulation maneuvers failed to convert the rhythm

Materials and Methods: Acupressure was applied on Nei-Guan (PC6).

Results: Acupressure applied on PC6 immediately converted the tachycardia to a normal sinus rhythm, thus successfully terminated an episode of PSVT complicated with hypotension and chest pain in the patient reported

Conclusion: Acupressure of PC6 is easy to perform and safe, and can be done when other resuscitative measures are ongoing the same time. It is harmless and appropriate for certain groups of patients such as the elderly, children and pregnant women and worth trying before the administration of medication.

Keywords: Paroxysmal supraventricular tachycardia (PSVT), Nei-guan (PC6)

We described a 75-year-old man with a history of recurrent attacks of paroxysmal supraventricular tachycardia (PSVT). The patient presented to the emergency department (ED) with complaints of palpitations. When vagal stimulation maneuvers failed to convert the rhythm in the ED, acupressure was applied on Nei-Guan (PC6) and immediately converted the tachycardia to a normal sinus rhythm. Termination of PSVT by acupressure has not heretofore been reported. The literature was reviewed and possible mechanisms along with associated theories were discussed.

Paroxysmal supraventricular tachycardia (PSVT) is one of the most common arrhythmias presenting at the emergency department (ED). Common symptoms include palpitations, light headedness, and chest pain in a small proportion of patients with PSVT may also experience confusion or loss of consciousness. Most narrow complex PSVTs are due to re-entry circuits within the AV node (60%–90%) or via a bypass tract with anterograde conduction through the AV node (Holdgate A et al, 2006). They can be sometimes treated with simple physical maneuvers such as forced breath holding or carotid sinus massage (Ornato JP, 1988; Wen ZC, 1998). When simple physical maneuvers fail, PSVT can be treated at the ED with a variety of drugs. The two most commonly used drug types are adenosine and calcium channel antagonists, such as verapamil. We reported the first case of PSVT successfully terminated by the use of acupressure applied on Nei-Guan (PC6).

Case Report

A 75-year-old man, weighing 90 kg and 183 cm in height, visited the outpatient clinic of cardiovascular medicine at the Tri-Service General Hospital in Taipei, Taiwan on July 14, 2008. His main complaint was intermittent palpitation with some chest tightness for the past few days. He had been experiencing intermittent palpitation; chest tightness with dizziness during sudden posture changes in recent three months. At the outpatient clinic, the physician also identified an unusual paleness of his face. With increase in severity and frequency of symptoms, he was transported to the ED. The patient had previously tried forced breath holding and carotid massage. However, none had made any difference in relieving his symptoms. He was asked to provide a history of past diseases that might be associated with the current condition. He had been

taking medications for diabetes mellitus and hypertension for more than 20 years and also had a coronary artery bypass graft (CABG) surgery about 12 years ago. Also, he had a stroke about three years ago but that left him with no neurological sequelae. He has a stent in his left internal carotid artery due to critical stenosis.

Physical examinations was conducted at the ED. Body temperature was 36.6°C centigrade, the blood pressure was 109/52 mmHg. On auscultation the cardiac examination revealed a tachycardia of 130–140 beats/min without murmurs. The jugular veins were engorged and there were visible carotid artery pulses. Breathing sounds were clear.

IV access was obtained with a 20-gauge catheter and 0.9 saline solution at 30 ml/hr was given to keep the vein open. Blood drawn at this time revealed the following laboratory data: sodium 140 mEq/L, potassium 3.5 mEq/L, chloride 104 mEq/L, BUN 20 mg/dl, creatinine 1.3 mg/dl, glucose 257 mg/dl, magnesium 2.2 mEq/L, and calcium 9.2 mg/dl. ECG demonstrated a PSVT of 130 beats per minute (Figure 1). Carotid massage was performed for ten seconds on the right side but failed. Acupressure applied on PC6 using an intermittent pressure with the index finger for about one minute was instituted immediately, resulting in abrupt cessation of the PSVT, and conversion to a relatively stable sinus rhythm at a rate of 85 beats/min (Figures 2 and 3). When acupressure was applied on PC6, he reported a sense of progressive relief in terms of chest tightness and palpitation. Dizziness improved with an easier breathing pattern. His face turned less pale. He could feel the pressure on his wrist but it was not very painful. Chest pain ceased and the blood pressure rose to 129/70 mmHg. Normal sinus rhythm was then maintained and the patient had no further symptoms. The patient was subsequently discharged from the ED. Admission was suggested but the family chose to visit the outpatient clinic of cardiovascular medicine for further evaluation and management, such as radiofrequency ablation.

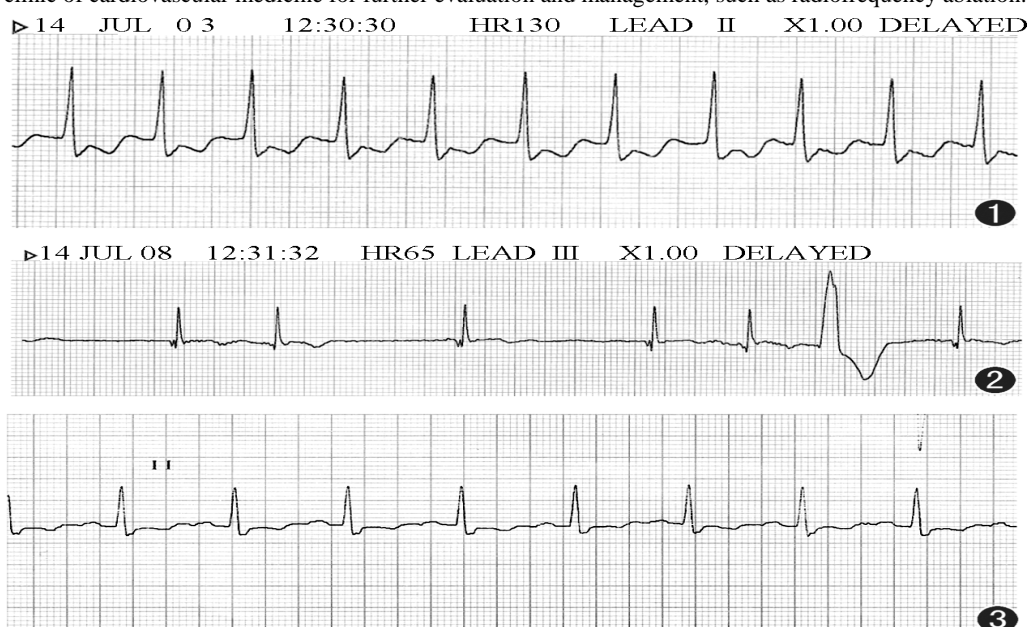


Figure 1: EKG recorded during palpitation and chest tightness attack which showed PSVT.

Figure 2: After acupressure applied on PC6 for about one minute; PSVT terminated and some ventricular premature contractions were recorded.

Figure 3: EKG recorded about 30 seconds later after the recording of Figure 2 and showed sinus rhythm.

Discussion

The treatment of PSVT by using acupressure was not found in literature when we searched MEDLINE/PubMed, EMBASE, Ovid, MD consult and Cochrane library. However, there were several studies reporting the clinical observations of the effect of acupuncture on PC6 for PSVT when we searched by hand. Lee reported that 83.33% of the subjects receiving bilateral PC6 acupuncture were responsive to the treatment as compared to 70.83% in the control group (Lee YH and Guo RS, 2009). Lee (2004) reported 80.39% of responsiveness using acupuncture on points including PC6. Gi and Liou (2005) reported 90% of the subjects experienced the effect and it was still effective for recurrence. Don (2006) compared the effect of acupuncture on PC6 and intravenous propafenone and found no significant difference. Tsao (2002) injected 5 mg of phenylephedrine in the PC6 to treat PSVT and concluded that it was more effective than acupuncture alone.

PSVT is a common tachyarrhythmia which occurs in all age groups including healthy young adults as well as associated with rheumatic, atherosclerotic, hypertensive and thyrotoxic heart disease (Hillis LD et al., 1980). The causes of our patients PSVT may be the underlying

atherosclerotic heart condition as he had the history of coronary artery bypass graft (CABG) surgery. Symptomatic PSVT requires immediate treatment to prevent further complications. Adenosine has been widely used to treat PSVT in recent years with reported efficacy similar to calcium channel antagonists (Bolton E, 2000). It acts through inhibiting cAMP-mediated calcium influx and enhancing potassium conduction. Owing to the relatively short half-life, conversion to sinus rhythm may not last as a subsequent ectopic beat may trigger a new episode of PSVT. Unpleasant side effects including dyspnea, flushing and a sense of impending death or doom may follow (Hourigan C et al., 2001). Calcium channel blockers have been used in the treatment of PSVT and are effective in up to 90% of patients (Hondeghe LM and Roden DM, 1995). The mechanism is the blockade of calcium dependent conduction through the AV node. However, they can cause negative inotropy and peripheral vasodilation, which may further lead to hypotension. Longer half-life (3 to 6 hours) makes adverse effects persist. They are also contraindicated in patients who are already on beta-blockers as the combined effect may lead to significant bradycardia (Hondeghe LM and Roden DM, 1995).

Due to the distinguishing characteristic of frequent abrupt manifestations and the potentially serious nature of this arrhythmia, it is important for both clinicians and patients to be familiar with the treatment methods other than medication.

The acupoint Nei-Guan (PC6), according to the WHO Standard Acupuncture Point Locations, is on the anterior aspect of the forearm, between the tendons of the palmaris longus and the flexor carpi radialis, two body-inches proximal to the palmar wrist crease. PC6 is the most studied acupoint regarding its effect on the autonomous nervous system (ANS) and is well-known for its anti-emetic effects. Electroacupuncture at PC6 is found to be well-tolerated and effective as an adjunct in reducing chemotherapy-related nausea and emesis (Choo SP et al., 2006). PC6 is associated with the Yin Linking vessel.

According to *Classic of Difficulties*: “When the Yin Linking vessel is diseased, heart pain will result”. Other traditional indications for this extraordinary channel include chest pain, fullness and pain of the lateral costal region. PC6 is probably the single most important point for the treatment of heart ache and chest pain, as well as pain in the lateral costal region, whatever the etiology. Clinical indications include heart rate, rhythm problems and heart pain. According to traditional Chinese medicine theory, the heart and pericardium are associated with the brain and its functions. The pericardium is also considered to protect and regulate the cardiac function. Points of the pericardium channel, such as PC6, have a strong effect on the circulation and are therefore indicated in cardiac disorders including arrhythmias.

The above descriptions may explain why it was effective dealing with PSVT using acupressure of PC6 from a Chinese medicine perspective. However, the termination of PSVT using PC6 acupressure has never been reported before. The possible underlying mechanism still remains unclear and lacks solid evidence. We understand that acupressure is different from acupuncture or transcutaneous nerve stimulation (TENS), but studies results regarding the heart rate reducing effect of acupuncture/TENS applied at PC6 should be helpful when exploring the possible mechanisms. The ANS provides the primary control of heart rate. The decreased response in heart rate following acupuncture could be attenuated by administration of atropine and propranolol. Therefore, the acupuncture-induced response of a decrease in heart rate has been suggested to be the result of a reciprocal coordination of an increase in parasympathetic nerve activity and a decrease in sympathetic nerve activity (Li Z et al., 2005). Cheung and Jones (2007) found that Acu-TENS applied to bilateral PC6 resulted in a faster return to pre-exercise heart rate compared to placebo, suggesting that PC6 has a key function to reduce heart rate in healthy subjects. Nishijo et al. (1997) suggested that the mechanism for acupuncture induced heart rate change is via stimulation of cardiac cholinergic vagal efferents and/or depression of cardiac sympathetic neural activity. Syuu et al. (2001) reported that electroacupuncture applied at PC6 seems to have modulatory effects on the cardiovascular system function in an animal model through the modification of sympathetic tone. The results of the study of Imai and Kitakoji (2003) also revealed the underlying mechanism of acupuncture stimulation that involves a reduced sympathetic drive to the heart. An inhibitory effect on cardiovascular sympathetic reflexes, induced by stimulation of PC6, may be related to a stimulation of opioid receptors associated with a reduction in reflex-induced myocardial ischemia and myocardial oxygen demand (Li P et al., 2001).

Many physical maneuvers including carotid sinus massage, the Valsalva maneuver, coughing, gagging, pulling on the tongue, the diving reflex, bilateral ocular compression are reported to have some effects on PSVT, but some of them may be dangerous. However, lower success rates may be related to variability in instructions given to patients on the correct technique for performing them, such as a Valsalva maneuver (Taylor DM and Wong LF, 2004). Thoughts must also be given when the subjects are the elderly, children or pregnant women with specific conditions such as cerebrovascular disease. Compared to those physical maneuvers, acupressure applied to the wrist is relatively safe and requires less technique. The wrists are easy to approach and the effect is more prompt as well. The limitations of this report include single case study, lack of complete 12 lead ECG record and loss of follow up of the condition of the patient.

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The acupressure applied on PC6 was efficacious in terminating an episode of PSVT complicated with hypotension and chest pain in our patient. It was successful when other physical maneuvers had failed. Acupressure of PC6 is easy to perform and safe, and can be done when other resuscitative measures are ongoing the same time. It is harmless and appropriate for certain groups of patients such as the elderly, children and pregnant women and worth trying before the administration of medication. The underlying mechanism still warrants further research.

Acknowledgement

This investigation is sponsored by the project: CMU102-N-10 provided by China Medical University, Taiwan.

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