

Case Report

Transcutaneous pacing: a life saviour

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ABSTRACT

Doukky Rand colleagues acknowledged that Transcutaneous Cardiac Pacing is a temporary method of pacing which may be indicated in patients with symptoms of severe or hemodynamically unstable bradyarrhythmias. It is found to be extremely helpful in patients with reversible or transient conditions, such as digoxin toxicity and in atrioventricular block in the case of inferior wall myocardial infarction, or when transvenous pacing is not available or there are high chances of complications. Widened QRS complex indicates successful attempt followed by a distinct ST segment and broad T wave. The hemodynamic response to pacing is to be confirmed by the assessment of patient's arterial pulse waveforms. Transcutaneous pacing is a boon to manage and treat intra op dangerous bradycardia.

Keywords: Atropine resistant bradycardia, Bradyarrhythmias, Complications, Contraindications, Pacing indications, Transcutaneous pacing

INTRODUCTION

For the first time transcutaneous pacing was introduced to the world by Zoll and associates in 1956 as a new method of treating asystole and severe bradyarrhythmias.^{1,2} External non-invasive pacing offers innumerable advantages over invasive pacing. It is widely available on crash carts, along with the defibrillator machines. It is simple to perform and also requires minimal training and, therefore, may be practiced by physicians, nurses, and paramedics. Because it can be performed expeditiously, non-invasive pacing can be initiated fast eliminating the setup and the insertion time of invasive techniques (transvenous and epicardial pacing). Later in the 1950's development of transvenous pacing leads took place, and interest in external pacing faded. Transvenous pacing has been very popular and has served as the backbone of urgent temporary pacing since then.¹

In external cardiac pacing, pacer pads activate a focal point located in the left ventricle of our heart. Electricity generated then starts spreading to the rest of the

ventricular myocardium from that focal point. Direct capture of the atria is extremely difficult to obtain despite of correct pads placement. Indirect capture can still be obtained by retrograde conduction through the atrioventricular node conduction.³ Transcutaneous cardiac pacing has proved itself clinically very effective in treating patients with atropine resistant unstable bradycardia. Authors will be discussing one such interesting case below.

CASE REPORT

Authors report a case of 63 years/male weighing 70kgs. Patient was a known case of Hypertension and Parkinsonism and was receiving regular treatment for the same. His effort tolerance was good. His MET score was more than 4. He had no history of syncope or dizziness in the past. He was posted for three level lumbar spine decompression and fixation. He was posted for lumbar spine decompression and fixation. On general and systemic examination no abnormal findings were noted. Pre op investigations were performed in which all routine

blood investigations were normal, chest x-ray and ECG were also normal. 2D echo showed LVEF-60%, with no regional wall motion abnormality. Patient was taken up for the surgery and administration of general anaesthesia was planned. In the operating room baseline heart rate was noted to be 70/minute and the blood pressure was 156/80 mmHg and 96% SPO₂ on room air. A 20g cannula was present in situ on left hand and the patient was coloaded with ringer lactate. During general anaesthesia induction, patient was well preoxygenated, intravenous induction was done with Injection Fentanyl 100mcg Injection Midazolam 1mg Injection Propofol 120mg and Injection Succinyl choline 100mg. After administration of Injection Succinyl choline patient developed persistent and resistant bradycardia with hypotension. Heart rate dropped to 20-25 beats per minute and blood pressure was 60/36 mmHg.

The surgery was deferred then and there. Patient was extubated after bradycardia responded to medical treatment (Inj. Glycopyrrolate 0.2mg, Inj. Atropine 0.6mg +0.6mg+ 0.6mg+ 0.6mg a total of 4 doses, Inj. Ephedrine 15mg). It took a long time for heart rate to stabilize. Patient was shifted to ICU for further cardiac evaluation. Dobutamine stress test was performed which reported negative. Holter monitoring was done which revealed 11-12 sinus pauses in 24 hours, measuring around 2.3 seconds. Patient was asymptomatic otherwise. Surgery was rescheduled, a multidisciplinary approach was planned this time. A team comprising of a senior anaesthetist, cardiologist, spine surgeon and ICU intensivist was constructed. The patient and the relatives were explained regarding the high risk of anaesthesia and written informed consent was taken for the same. Post op ICU and SOS mechanical ventilation was also explained. In view of the nature of the surgery (three level laminectomy L1-L2, L2-L3, L3-L4) and duration of the surgery, authors decided to go ahead with general anaesthesia again. All emergency drugs including isoprenaline, adrenaline, noradrenaline, antiarrhythmic drugs and defibrillator pads were kept ready. All necessary drugs and equipment for General anaesthesia were also prepared. Author's biggest concern was, what if bradycardia occurred again? Permanent/ Temporary pacing before the surgery was not indicated as per guidelines as-1) Patient was completely asymptomatic 2) Sinus pauses less than 2.5 seconds. All possible precautionary measures were taken to avoid bradyarrhythmias, patient suffered from last time. Since, Injection Succinylcholine was the culprit last time; drugs which can possibly cause bradycardia were noted and were avoided.

As anaesthetists, authors were worried about the possibility of multiple bradycardia episodes during this long duration surgery despite avoiding certain drugs. This prompted the use of Transcutaneous pacing on the patient as a precautionary measure, since the last bradyarrhythmia episode was resistant to medical treatment. Though this did not qualify as an indication for pacing according to

the guidelines, but to avoid serious consequences of sinus arrest, escape rhythm, failure, atrial fibrillation and severe hypotension, authors went ahead with transcutaneous pacing, as it's a proven lifesaving method and is non-invasive as well. Patient was taken in the operation room. Pre induction vitals were, heart rate-70bpm blood pressure-160/85 mmHg SPO₂-100% on room air. Radial line was cannulated under local anaesthesia for beat to beat pressure monitoring. Oxygen was given at 6 litres per minute by Hudson's mask. Two large bore IV cannula were taken. Pacing pads were applied preoperatively in anteroposterior position and were well secured. Pacing rate was set at heart rate-80 BPM and stimulating current was gradually increased and set at 80mA. Capture was confirmed in the monitor. Settings done and checked before induction. After three minutes of preoxygenation, Injection Fentanyl 100mcg, Injection Glycopyrrolate 0.2mg and combination of Inj. Propofol 80 mg and Inj. Etomidate 6 mg was used to counteract bradycardia and hypotension due to propofol. Injection Atracurium 50mg was used as muscle relaxant. Patient was intubated with 8 no. flexometallic endotracheal tube and it was fixed at 22 cm at the angle of the mouth after confirming bilaterally equal air entry. Eyes were taped and padded. Any agent that caused bradycardia and hypotension was avoided. Anaesthesia was maintained with air+oxygen +desflurane and Injection Atracurium as top ups were given for muscle relaxation. After an hour of induction patient had sinus pauses. Since the hemodynamics were maintained and the patient was stable, prone position was given and surgery started. Total fresh gas flow was adjusted to 0.6 li/min and a MAC of 0.7 was maintained. Heart rate dropped from 68 /min to 45/min. It was sinus bradycardia associated with drop in blood pressure from 108/68 to 67/38 mmHg. To treat this, Inj. Atropine 0.6 mg+ Inj. Ephedrine 6 mg was given. There was no change in the vital parameters. Inj. Atropine 0.6 mg IV was repeated twice and a total dose of 1.8 mg was given in 3 mins. Inj. Ephedrine was also repeated subsequently to a total of upto 30 mg. Surgeon was informed and the surgery was stopped temporarily. Since there was no improvement in the hemodynamics after the above treatment and we already had the transcutaneous pacing pads on, it was decided to activate it. Post pacing, the heart rate came up to 82/min.

Blood pressure now was 124/78 mmHg. Surgery was restarted. During the intra operative period of about 4 hours, these events of sinus bradycardia occurred almost every 20 to 30 minutes and each time, pacing was initiated. After the completion of the surgery, patient was reversed, extubated and sent to ICU for observation as per the pre operative plan. Intra operative blood loss was approximately 250 ml and the urine output was 0.5 ml/kg/hr.

The patient was comfortable and had a VAS score of 2/10. During his 24 hrs stay in the ICU, he did not require pacing and his vital parameters were maintained. For

paincontrol patient received Inj. Paracetamol 8hrly and Inj.Tramadol 50 mg as and when required.

DISCUSSION

Sinus node dysfunction due to aging is a known entity and occurs due to progressive fibrosis of SA node and surrounding tissues which most commonly leads to bradyarrhythmias. Bradycardia is generally defined as a heart rate less than 60 beats per minute. However, pacing is not indicated and required in all cases of bradycardia. Transcutaneous pacing should only be applied in situations of emergencies which includes systolic blood pressure less than 90 mmHg, and heart rate less than 40 and if an arrhythmia is causing a compromise in patient's organ perfusion. Prior to application of transcutaneous pacing, pharmacological treatment eg: Injection Atropine 0.6 mg can be given as a measure to reverse the bradycardia.³

Transcutaneous cardiac pacing is a well-acknowledged temporary method of pacing which can be performed in multiple clinical settings, including some of the major cardiac emergencies. External pacing is indicated as a temporary method of pacing in patients with severe symptomatic or hemodynamically unstable bradyarrhythmias, particularly useful in those who do not respond to pharmacologic therapy (such as inj. atropine). In a case report by Correia, Mariana et al, intraoperative progression to complete heart block was managed with transcutaneous pacing as cardiologic evaluation showed no indication for definitive pacing.⁴ So, in the setting of an urgent surgery Transcutaneous pacing served as a non-invasive, simple and effective approach.

Transcutaneous cardiac pacing which is the fastest method of cardiac pacing can be used until permanent pacing becomes available for the patient.⁵ All indications for permanent cardiac pacing are also considered indications for transcutaneous pacing. Indications for permanent cardiac pacing, with supporting evidences, are well mentioned by the American College of Cardiology (ACC) and the American Heart Association (AHA). It talks in detail about all intrinsic and extrinsic responsible for conduction abnormalities. Also, their testing and treatment guidelines.⁶

Because transcutaneous pacing is a temporary method of cardiac pacing, it may be indicated for the treatment of a reversible condition for which permanent pacing is contraindicated. Some other conditions which may require temporary cardiac pacing are as follows⁷-

- Injury to the sinus node or other parts of the conduction system after cardiac surgeries - Injuries after coronary bypass surgery are known to be temporary, whereas injuries after valve surgeries or cardiac transplantation are permanent.
- Cardiac and chest trauma in association with sinus node or AV node dysfunction

- Metabolic and electrolyte disturbances (eg: hyperkalemia)
- Right-heart catheterization in a patient with a left bundle-branch block or intraventricular conduction delay - This may have a possibility of temporary complete heart block, in these situations transcutaneous cardiac pacing is always indicated.

In a study by Im et al, prophylactically used transcutaneous pacing for expected bradycardia during carotid stenting was performed and it turned out to be safe and effective in preventing bradycardia and hypotension during the procedure, with a decrease in additional inotropic drug support during the procedures.⁸

- Drug-induced bradyarrhythmia (eg, digitalis toxicity) - If the drug has to be continued and there is no other alternative, consider permanent pacing
- Other diseases that may be associated with temporary damage to the sinus or AV node (eg, Lyme disease or bacterial endocarditis)

Contraindications

Temporary transcutaneous cardiac pacing should not be considered for asymptomatic patients with a stable rhythm (eg: first-degree AV block, Mobitz I, or a stable escape rhythms). For example, pacing an asymptomatic patient with a stable escape rhythm may render the patient pacing-dependent, and with holding pacing can then cause asystole.⁵

Potential skin burn lesions, pain on application, and failure to capture are the major limitations of transcutaneous pacing. It is important to explain the patient and relatives about the procedure and especially about potential discomfort related to skin tingling and burning and associated skeletal muscle contractions. Informed consent should be taken for the same.

CONCLUSION

By the present case, authors emphasize that preoperative prophylactic application of transcutaneous pacing should be advocated in patients with high risk of bradyarrhythmias intraop, even when they are asymptomatic.

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