INTRODUCING AN EXTERNALIZED PERMANENT ACTIVE FIXATION PACING AS A SAFEST APPROACH IN PATIENTS REQUIRING PROLONGED TEMPORARY PACING

ABSTRACT:
Temporary-permanent (T-P) pacemakers can serve as safest, short-term, easily implanted and stable temporary pacing option in various acute clinical conditions. Managing patients with systemic infections and concurrent need for acute pacing due to new-onset of hemodynamic relevant bradycardia such as at high grade AV-block is very difficult. Immediate permanent pacemaker implantation is deferred in patients with severe sepsis or other related medical conditions. So prolonged temporary pacing is needed as a bridging therapy. The complication rate of temporary pacing including dislodgement of pacing leads is significantly rising which can lead to further morbidity and mortality of the patient. To minimize this complication, an active fixation permanent pacing approach was introduced. Here, we have treated 3 patients including Hepatocellular carcinoma presented with slow atrial fibrillation, severe sepsis with complete heart block and patient with GI Bleeding presented with Complete Heart block with temporary active fixation pacing connected to an externalized pacemaker. This technique proves to be safest, effective and improves the survival benefit in patients who require prolonged temporary pacing.

Keywords:
Temporary pacing; Complete Heart Block; Temporary-permanent active fixation; dislodgement; severe sepsis; externalized pacemaker;

INTRODUCTION:
Temporary Permanent cardiac pacing is indicated particularly in patients with severe symptomatic bradyarrhythmia including severe symptomatic bradycardia, second or third degree atrioventricular block [AVB], sick sinus syndrome, atrial fibrillation with slow ventricular rate peri procedural period of TAVR or surgical AVR.
Here we are discussing the patients who need prolonged temporary pacing which is frequently associated with complications such as lead displacement, right ventricular perforation, and local or systemic infections \(^2,^3\) 

These patients require the use of external permanent pacemaker active fixation electrodes to achieve appropriate temporary pacing when implantation of permanent pacemaker is deferred due to various acute medical conditions. It has the benefit of greater electrode stability and is easier to place in different areas of the heart. It can be connected to a permanent pacemaker generator on the other hand, which allows for programming of more physiologic pacing modes that can help maintaining the patient in a stable clinical condition and allow to walk without clinical deterioration.\(^4\)

**CASE 1:**

A 80 years old male, known to be suffering from type 2 diabetes mellitus, hypertension and newly discovered HCC (Hepatocellular carcinoma), presented to the emergency department with complaint of disturbed conscious level for four hours. ECG showed slow atrial fibrillation with average heart rate of approximately 30 bpm (beat per minute). Echocardiography showed LVEF = 55%. Transvenous Temporary Pacemaker (TPM) was passed through left subclavian vein with apical positioning, ruling out any metabolic abnormalities. Blood samples were drawn after stabilizing the patient which revealed elevated liver enzymes, bilirubin, INR and thrombocytopenia. Ultrasonography showed shrunken cirrhotic liver with hepatic focal lesion and moderate ascites. As the patient was in hepatic encephalopathy grade IV, patient was irritable that leading to displacement of the lead of TPM several times. TPM was re-positioned again and again. Patient was receiving his treatment including antibiotics to prevent against susceptible infection and measures for hepatic encephalopathy including enemas. As it would take time to treat the patient and the TPM lead (fixed passively) got dislodged again and again, an active fixation 58 cm St Jude lead introduced percutaneously through the right subclavian vein to the right ventricle, assuring its apical site fluoroscopically, implanting it with active fixation screw system. The pulse generator was stitched on the bare skin (hence termed external PPM). In this procedure with assured the pacemaker location against the patient vigorous movement and giving chance for the patient to be transferred to the hepatology department to be managed and lowering the procedure risk and cost against the patient prognosis.
CASE 2:

52 year old female patient presented in the emergency department with complaints of dizziness. Examination showed lower rate of radial pulse with BP 150/70 mmHg. Chest was clear to auscultation and there was no neurological deficit. ECG showed complete heart block so TPM passed (via right subclavian vein) in the emergency department to save the patient. Labs were collected which showed increased TLC, referring to underlying infection. Antibiotic cover was started. As the infection may take more than a week to resolve, it was planned to proceed for external PPM (Temporary PPM) because the patient became TPM dependent meanwhile and we could not afford to lose the patient if the TPM gets dislodged during the infection resolution time. So using Right internal jugular vein approach, single chamber VVIR generator was fixed to the right side of neck with the RV lead actively fixed to the RV apex.

After the resolution of infection, Dual chamber PPM was implanted on the left side via left subclavian vein approach and external PPM was removed. Patient was discharged and asked to visit Pacemaker clinic after 3 days. She was asymptomatic and doing well.
After doing the procedure

After the TPM is removed and external PPM is fixed to the skin
CXR of the patient after external PPM fixation.

CASE 3:

A 71 years old male, who is known case of type 2 diabetes mellitus and hypertension, presented in the emergency department with complaints of palpitations and dizziness for 4 hours. ECG showed complete heart block with ventricular escape rate of approx. 40 bpm. Echo showed LVEF =40%.

Transvenous Temporary Pacemaker (TPM) was passed through right femoral vein in the emergency department and Dual chamber PPM implantation was planned after ruling out the metabolic abnormalities. Blood samples were drawn after stabilizing the patient. 3 hours after the TPM implantation, intermittent loss of pacing was observed. Patient was taken to the cath lab and the TPM lead was adjusted accordingly. Blood tests came out with increase in TLC, complete urine examination showed pus cells. I.V. antibiotic cover was started to treat the infection so that PPM could be implanted. Next day TPM was again re-adjusted because it got displaced again. As it would take time to treat the infection and the TPM lead (fixed passively) got dislodged again and again, the RV lead of PPM was placed through active fixation via Right internal jugular vein approach on temporary basis and generator was stitched on the bare skin (hence termed external PPM) till the infection gets resolves.

During the hospital stay patient developed upper GI bleeding. Gastroscopy and colonoscopy was done which showed Tubular adenoma, esophageal
candidiasis and pangastritis. Successful Mesenteric artery embolization was done while the patient was on Temporary PPM (external PPM).

After 3 weeks, as the infection got resolved, Dual chamber PPM was implanted by creating pocket on the left side of chest and the right sided external temporary PPM was removed. Patient is doing well now and is active in his usual daily life activities.

External PPM Implanted through Active fixation pacing via right internal jugular access

ECG done on Arrival in Emergency showing Complete AVA Block with ventricular rate of 40 beats/min
Post procedure dressing applied

**DISCUSSION:**

Temporary Permanent Cardiac Pacing indicates as Electrical Cardiac Stimulation used to treat Bradyarrhythmias or tachyarrhythmias until long therapy can be initiated. Its purpose is to reestablish the circulatory integrity and normal hemodynamics that are acutely compromised by slow and fast heart rate. 5

Patients can experience signs depending on the degree of loss of capture, dizziness, lightheadedness, syncope, chest discomfort or hiccups due to phrenic nerve stimulation, due to atrial lead anomalous position. 6

The complication rate of temporary pacing is significantly rising up to 37% [7-13].

Rate of dislocations of the lead (up to 19%). Risk of local infection or thrombosis (up to 34%) [14,15]

Lever et al. first described a new technique for temporary pacing using a permanent active-fixation bipolar pacing lead. The described technique was used for prolonged temporary pacing in 20 patients with severe symptomatic bradycardia or pacemaker dependency. 16
The active fixation pacing electrodes are used to achieve appropriate temporary pacing in patients who need prolonged temporary when permanent pacing is delayed due to various acute clinical conditions. It has the benefit of greater electrode stability and easier placement in different areas of the heart even minimizing the risk of perforation with the greater flexibility. The accidental displacement of the electrode is common in long-term applied provisional pacemakers, and the outcome with an active fixation system can be compromised. So it can be connected to a permanent pacemaker generator which allows for programming of more physiologic pacing modes that help maintaining the patient in a stable clinical condition and patient can walk without clinical deterioration.4,17

A single study was conducted, in that a conventional temporary pacemaker was compared to a temporary permanent active-fixation bipolar pacing lead connected to a permanent pacemaker. The study included 49 patients out of which 26 patients received conventional temporary pacemaker, and 23 patients received externalized permanent pacemaker. So, there were 24 pacing-related complications noted in the conventional temporary pacemaker group as compared to only one event was observed in the externalized permanent pacemaker group (p<0.01). There was no lead dislocation, no need for resuscitation, or significant worsening of sensing or stimulation parameters during time of temporary pacing in the group with temporary permanent active-fixation bipolar pacing lead connected to a permanent pacemaker. Although few local infections were noted in patients with prolonged pacing time but no evidence of systemic infection related to the pacing system and no thrombosis occurred in any of the patients.18

Hence, the use of active-fixation permanent pacing leads connected to an externalized pacemaker for temporary pacing provides a safe, effective and easier to approach method for prolonged temporary pacing and as a bridge to permanent pacing or recovery particularly in patients requiring intermediate to long-term antibiotic treatment or in other related medical conditions.

**CONFLICT OF INTEREST:**

Nothing to declare

**CONCLUSION:**

The purpose of presenting this is that patients presenting with severe sepsis or other indications who defer permanent pacemaker implantation requiring prolonged temporary cardiac pacing can be benefitted by implantation with active-fixation permanent pacing. It is a safe, effective,
and convenient method. Subclavian approach is more comfortable than internal jugular access. Externalized permanent active-fixation pacemaker lead connected to a permanent pacemaker generator for temporary pacing may also be beneficial because of improved lead stability, and greater patient mobility and comfort. This technique is cost effective, improves the quality of life and minimizes the risks and complications associated with the immobilization of the patients.

REFERENCES:

5. https://www.uptodate.com/contents/temporary-cardiac-pacing


• DOI: 10.1016/j.rec.2011.07.023
• Acceso a texto completo