

Pectoralis Majore Myocutaneous Flap (PMMC) in A Patient with Ipsilateral Pacemaker Insitu -A Case Report

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ABSTRACT

Background: Patients with permanent pacemakers posted for surgical resection of carcinoma alveolus with reconstructive surgery pose several challenges, due to the proximity of the surgical field to the pacemaker. The challenges become nightmares when the flap harvested for reconstruction lies just below the pacemaker. This is probably the second case report in which the reconstructive surgeon had successfully harvested a PMMC flap from the same side as the pacemaker without causing any structural and functional damage to the pacemaker.

Case: We report successful anaesthetic management of an 80-year-old patient of carcinoma alveolus posted for marginal mandibulectomy with flap reconstruction under general anaesthesia, in whom PMMC flap was harvested from the same side of the chest as was his permanent pacemaker. Extreme caution must be executed while separating the subcutaneous tissue containing the pacemaker along with the clavipectoral fascia from the pectoralis muscle and the integrity of the pacemaker leads must be evaluated after the PMMC flap has been delivered into the subcutaneous tunnel above the clavicle.

Conclusion: Interference with pacemaker function due to electrolyte, acid-base disturbances, and electromagnetic interference leading to pacemaker failure and hemodynamic compromise and damage of the pacemaker generator and the leads during the flap harvesting were our primary concerns.

Keywords: Case report, Pacemaker, Reconstructive surgery

LIST OF ABBREVIATIONS

PMMC: Pectoralis Major Myocutaneous flap; ECG: Electrocardiogram; ICU: Intensive care unit; ECHO: Echocardiography; EMI: Electromagnetic interference; CIEDS: Cardiac Implantable Electronic Device; SVV: Stroke volume variation; ABG: Arterial blood gas

INTRODUCTION

Free flap microvascular reconstruction after resection of head and neck tumours is the standard of care. But sometimes in patients with cardiopulmonary comorbidities, locoregional flaps are preferred to decrease the duration of surgery. Pectoralis major myocutaneous (PMMC) flap due to its tissue bulk, robust blood supply and easier harvesting techniques is one of the commonest locoregional flaps used for various reconstructive surgeries.^[1,2] We report the successful harvesting of PMMC flap from the same side of the chest as the permanent pacemaker in a 80 years old patient of carcinoma alveolus posted for marginal mandibulectomy with flap reconstruction. To our best knowledge this is the second report where the reconstructive surgeon had successfully harvested the PMMC flap from the same side as the pacemaker without causing damage to the CIED.^[3]

CASE

An 80year old male of carcinoma lower alveolus was posted for marginal mandibulectomy with PMMC flap reconstruction. He had undergone a St Jude permanent pacemaker(VVI mode) placement 20 years back (Figure 1). Echocardiography showed an ejection fraction of 55% with concentric left ventricular hypertrophy, mild Mitral regurgitation, moderate tricuspid regurgitation and mild pulmonary artery hypertension and ECG showed atrial fibrillation with paced beats. His blood investigations were within normal limits. Informed consent, explaining the procedure, the risks related to flap and pacemaker was taken.



Figure 1

On the morning of surgery, the patient was shifted to the operation theatre after premedications and cardiac medications as advised by the cardiologist. Pacemaker was evaluated and reprogrammed to VOO mode. In the operation theatre, after applying all standard monitors, a16G intravenous access was taken. His left radial artery was catheterised for invasive blood pressure monitoring. Edward lifescience cardiac monitor was used to measure cardiac output and stroke volume variation guided fluid was administered. A 6 F femoral sheath was inserted into the right femoral vein for temporary pacing in case of pacemaker malfunctioning and defibrillator was kept ready along with emergency drugs.

In the presence of a cardiologist, general anaesthesia was induced with injection fentanyl(2 μ /kg),propofol 2mg/kg and atracurium 0.5mg/kg. The patient had hypotension after induction, managed with fluid bolus and injection noradrenalin infusion. Anaesthesia was maintained with oxygen, nitrous oxide, sevoflurane and infusion of atracurium. For resection, only surgical blade, bipolar cautery and Ligasure was used. The cautery dispersal plate was placed on the leg. The tumour resection was associated with blood loss of 600ml which was managed with one packed cell and one colloid transfusion. The dissection of the PMMC flap was done under magnification using utmost precautions to prevent damage of the leads of pacemaker. The lower margin of the PMMC flap was kept around 10-15 cm from the pacemaker. The subcutaneous tissue containing the pacemaker generator and the leads were carefully dissected out along with the pectoralis fascia (**Figure 2**).The patient had occasional ventricular ectopics during the dissection of the clavipectoral fascia but was haemodynamically stable. After PMMC flap was harvested, the muscle was passed inside the subcutaneous tunnel over the clavicle. The clavipectoral fascia was incised to increase the space in the tunnel through which the PMMC flap was retrieved into the defect area without any tension. The position of the pacemaker generator and the integrity of the leads were confirmed, and the donor area defect carefully closed in 2 layers. After the completion of surgery patient was shifted to icu for elective ventilation and monitoring . The pacemaker was reprogrammed to its original VVI mode. ABG analysis and a 2D ECHO was done after 48 hours which was normal. He was weaned of the ventilator and extubated the next day evening. The postoperative period was uneventful with a healthy flap and healed doner site.



Figure 2

DISCUSSION

PMMC flap reconstruction in a patient with a permanent pacemaker poses several challenges due to the proximity of the pacing apparatus to the surgical field. The important considerations are pacemaker dependency, prior reprogramming to asynchronous mode, perioperative arrhythmias due to electrolytes, and acid-base disturbances. Electromagnetic interference can lead to pacemaker failure and hemodynamic compromise.^[3,4] Moreover, extreme caution must be executed during the raising of the subcutaneous flap containing the pulse generator and the leads. ECG should be examined for arrhythmia and pacing spikes. A pacing spike before every P-wave and/or QRS complex suggests that the patient is dependent on a pacemaker.^[4]

The pacemaker is affected by the EMI of an electrocautery unit (ECU). The electrical interferences of the cautery may be perceived by the pacemaker as intrinsic rhythm and the pulse generation may be inhibited so the electrocautery bursts should be limited to one second every 10-second interval.^[3,4] The electrosurgical receiving plate must be positioned as far as possible from the pacemaker. Invasive arterial blood pressure monitoring and cardiac output monitoring are recommended in these patients. The arterial waveform determines whether the electrical pacing signal had resulted in a mechanical ventricular contraction and thus asystole can be detected at the earliest.

High doses of opioids or dexmedetomidine should be used with caution. In patients with long QT syndrome, haloperidol, ondansetron and high doses of inhalation agents are avoided due to the risk of polymorphic ventricular tachycardia. Succinylcholine and etomidate causing myoclonus and the use of peripheral nerve stimulators should also be avoided.^[5,6]

If the patient is pacemaker dependent and has been programmed to a fixed rate, hypovolaemia will not cause tachycardia^[4,5]. Thus SVV (stroke volume variation) guided fluid administration and judicious blood transfusion must be done to maintain haemodynamic stability.

In the event of an arrhythmia, all sources of EMI should be discontinued to allow proper interpretation of the rhythm. Total failure of a CIED device is rare but incidences of inappropriate delivery of shocks or ‘runaway’ high rate (180–200 beats/min) after exposure to electrocautery have been reported.^[4] Temporary pacing devices and defibrillators must be ready to deal with these situations. The functioning of the pulse generator and the integrity of the leads must be evaluated at regular intervals to prevent catastrophe.

CONCLUSION

With utmost precautions and refined surgical skills, PMMC flap may be harvested from the same side of the chest as the pacemaker. Thorough knowledge of pacemaker functioning and preparedness for temporary pacing in case of pacemaker failure are the cornerstones in the management of these patients.

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