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A case of a morbidly obese geriatric patient with permanent pacemaker in situ posted for inter-scapular non healing ulcer debridement-A team work

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Abstract

Anaesthesia for geriatric patients who are morbidly obese is quite challenging. Understanding anaesthetic care for such patients can be related to the description of fundamental alterations in physiology and changes in the pharmacokinetics and pharmacodynamics of anaesthetic medications. With advances in cardiology and cardiothoracic surgery, several newer implantable cardiac devices have become common in the surgical population. Cardiac pacemakers are generally required in patients with symptomatic bradycardia or severe conduction block. Many of the newer implantable cardiac electronic devices are targeted at managing heart failure. While managing such patients for non-cardiac surgeries, specific issues related to equipment characteristics and troubleshooting should be a priority for anaesthesiologists. There is a possibility of malfunction of the devices resulting in catastrophic outcomes. Intraoperative care of the pacemaker and understanding its anaesthetic implication is crucial in managing these high-risk patients. We present the anaesthetic management of a case of an elderly morbidly obese male patient, posted for inter-scapular non-healing ulcer debridement having a permanent pacemaker in situ in DDDR (dual-chamber rate-modulated) mode. The pacemaker was changed and inserted previously for complete atrioventricular (AV) block on electrocardiogram (ECG) and degenerative AV conduction disease with complete symptomatic AV (atrioventricular) block, on electrophysiology study. The pacemaker mode changed to asynchronous ventricular pacing mode preoperatively. Erector spinae block with field block was given. The patient tolerated the surgical procedure well, and vital parameters were maintained throughout the operation. After the operation, the patient was shifted to the intensive care unit (ICU), the pacemaker was reprogrammed to DDDR mode, and vigilant monitoring was done. Postoperatively patient developed iatrogenic pneumothorax which was managed successfully by the

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pulmonology team. The patient was then transferred to the ward on postoperative day 3 in stable condition. This case highlights that a good erector spinae plane block + field block along with vigilant monitoring and team effort is a reasonable choice for elderly obese patients with permanent pacemakers coming for elective surgeries.

Key words: atrioventricular, debridement, pacemaker, pneumothorax, erector spinae plane block

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Introduction

The ability to treat patients with cardiac arrhythmias has greatly increased with the invention of cardiac pacemakers. The first pacemaker implantation was in 1958. Numerous new multiprogrammable pacemakers have been introduced to the market as a result of consistent advancements in software and device technology. This has also raised the number of possible pace indicators. The use of pacemakers is increasing for both conduction problems and arrhythmias. Patients with artificial (permanent) pacemakers who are planned for noncardiac surgery must take additional care during preoperative assessment and subsequent anaesthesia management. Coexisting disorders are evaluated and optimised as part of the pre-anaesthetic examination. In our case, the pacemaker's mode was modified to ventricular paced-none after consulting a cardiologist In our case, the pacemaker mode was adjusted to ventricular paced-none sensed- no response after consulting a cardiologist. Patients must be monitored to verify that paced electrical activity is transmitted to mechanical systole, which is best assessed by pulse oximetry, plethysmography, or arterial pressure waveform display. ECG monitoring must include the ability to detect pacing discharges. The right equipment must be available to give backup pacing or defibrillation in case some patients need an increased pacing rate intra-operatively to meet a scenario with a higher oxygen demand. A more recent advancement in pacemaker electrophysiology is the DDDR (dual-chamber rate-modulated) mode [1], which monitors both the patient's intrinsic P wave and the AV sequential sensor indicated rate response. We at this moment present the anaesthetic management and peri-operative considerations in geriatric morbidly obese patient on pacemaker during regional anaesthesia.

Case Report

A 78-year-old morbidly obese male weighing 105 kg and BMI of 36 kg/m^2 was scheduled for debridement of non-healing ulcer (since 6 months) over the inter-scapular region. He had undergone permanent pacemaker insertion (Boston Scientific–ALTURA50-S502^c-DDDR) 6 months back for symptomatic bradycardia and dyspnoea on exertion and was on Tab Atorvastatin 20 mg and Tab Rivaroxaban once daily, Tab Amiodarone 200mg twice daily. He had medical history of diabetes mellitus since 2 years and was advised to take regularly Tab. Metformin Hydrochloride 500 mg twice daily and Tab. Linagliptin 5 mg once daily. Patient also gave surgical history of undergoing Roux-en-Y gastric bypass 10 years back for weight reduction. He was a chronic smoker 1 pack of cigarette/day×25 years. Effort tolerance was less than four metabolic equivalents (METS). His general and systemic examination and routine blood investigations were within the normal limits. We had anticipated difficult airway as he had heavy jaw, short neck, mouth opening of 2 finger. pulmonary function tests (PFTs) showed a mild obstructive pattern. Electrocardiogram (ECG) (Fig. 1) showed

pacemaker rhythm and echocardiography revealed ejection fraction of 30%, global LV hypokinesia, dilated all chambers, severely depressed LV systolic function, and grade 1 diastolic dysfunction. Chest X-ray (Fig. 2) showed a pacemaker with an impulse generator. Thorough interrogation with competent authority was carried out for obtaining pacemaker details like when it was implanted, battery life, mode, effect of the magnet, baseline rate, etc. Our patient's baseline heart rate was 70/minute and on dual pacing (atrial and ventricular pacing), dual sensing (atrial and ventricular sensing), dual response and rate-adaptive (DDD-R) mode. Patient was kept nil per oral overnight. The cardiologist opinion was sought and requested to be on call for further help, if need be.

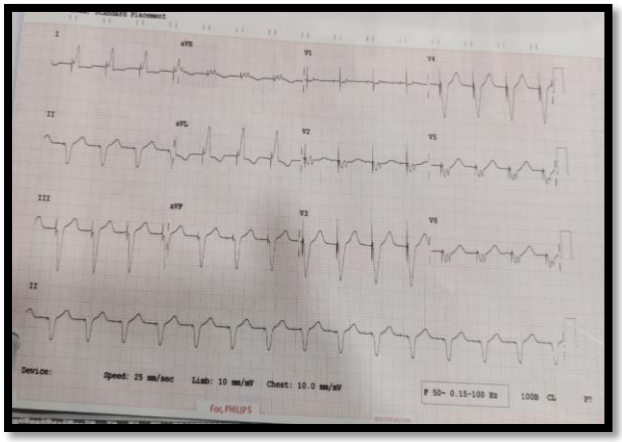

Fig 1: ECG showing pacemaker rhythm

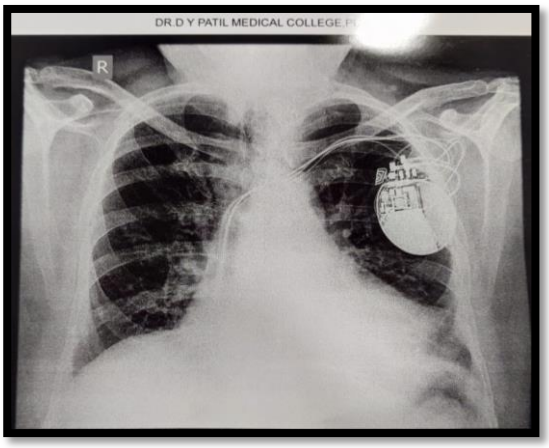

Fig. 2:CXR showing pacemaker insitu

Anaesthesia Technique

On the day of surgery, the pacemaker mode was changed to asynchronous fixed mode, i.e., ventricle paced, none sensed, no response (VOO), and the baseline heart rate was reset from 70 to 80/minute. 18G intravenous (IV) cannula was secured . Physiological monitoring included ECG, pulse oxymetry, non invasive blood pressure and temperature.

Considering the high risk status of patient we planned on giving USG guided Erector spinae plane block + Field block to the patient in sitting position in place of general anaesthesia. Anticipating decreased patient compliance in prone position regional block was carried out in seated position. Throughout the procedure patient was given 100% O_2 via Hudson mask. Under all aseptic precaution USG guided Erector spinae plane + field block was given using 23 G spinal needle with 15ml of 0.5% Bupivacaine+ 15 ml of 2% lignocaine+ 8mg(2ml) dexamethasone. The vertebral prominences (C7) were first palpated in the sitting position, and counting of the vertebral processes allowed for the precise localization of the T5 spinous process. We used a convex transducer in the parasagittal plane at the level of T5 spinous process. The erector spinae muscle and transverse process were visualized by moving the probe approximately 3–4 cm laterally from the midline. After the patient's skin was anesthetized by infiltration of 2 mL of 2% lidocaine, the block needle was inserted using an in-plane approach until it touched the T5 transverse process. The needle tip was positioned in the fascial plane on the deep surface of the erector spinae muscle. After confirmation of needle tip placement was made by hydrodissection of the interfascial plane with 2 mL of normal saline, 7 mL of 0.5% bupivacaine+ 7 ml of 0.2% lignocaine was administered. During the injection, craniocaudal distribution of the LA could be seen in real time. On the opposing

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side, the procedure was carried out in exactly the same way. At the end local anaesthetics were infiltrated around border of the surgical field (field block). After 30 min, the pinprick test revealed a sensorial block between T3 and T10 dermatomal levels. Patient was then placed in prone position and was handed over to surgeon . During intraoperative period care was taken to maintain normal BP and normal temperature. A bipolar cautery was used with return pad kept below left leg. Multimodal analgesia was administered by using injections Paracetamol Ig IV, injections Fentanyl 50 μg IV. Intraoperative period went uneventful. Post operatively patient was shifted to ICU where his heart rate was reset to DDD mode with heart rate of 70 beats/ minute. During postoperative period patient complained of breathlessness and a fall in saturation to 85% at room air for which a pulmonology opinion was taken. On radiological and clinical evaluation, it was found that patient had developed left sided pneumothorax which is most probably iatrogenic. Pulmonologist suggested to keep the patient on high flow oxygen support and planned for ICD insertion. Post procedure Chest Xray showed resolution of pneumothorax and complete expansion of lung. ICD was clamped 2 hours later. After 24 hours ICD was removed as patient improved and there was complete resolution of pneumothorax and patient improved symptomatically. The pain scores of patient was under 2 and no additional analgesic agent was required during the first 24 hours. Patient was in the ICU for 48 hours, and later was shifted to the ward. On the 5^{th} day he was discharged home.

Discussion

The presence of a pacemaker in a patient scheduled for non cardiac surgery necessitates specific attention during the preoperative assessment and subsequent anaesthesia management. Determining the rationale for the device's installation and evaluating its current function are both included in the patient's preoperative evaluation. The majority of these patients are in the geriatric age category, hence the anesthesiologist must adhere to geriatric anaesthesia standards[2]. With a patient who has a cardiac pacemaker, preoperative assessment and postoperative planning should be coordinated with a cardiologist and the pacemaker representatives for that particular device. In a patient with a pacemaker, a history of vertigo, pre-syncope, or syncope before surgery may indicate pacemaker dysfunction. It is important to conduct vigilant monitoring of the ECG, pulse oximetry, and arterial blood pressure. The most prevalent. AAI, VVI, and DDD pacing modes are the most prevalent pacing modes. The issues brought on by electromagnetic interference (EMI) from electrocautery have been lessened due to improved shielding of cardiac pacemakers. The electrical artefact created by electrocautery can be detected by a pacemaker as either interference or an intrinsic R(rate modulation) wave. The pacemaker will enter asynchronous (fixed rate) mode to ensure delivery of a paced beat if it detects interference and is unsure if a R wave is being produced. Alternately, the pulse generator could be inhibited by detecting the electrical artefact from electrocautery as a R wave. To reduce the chance that the pulse generator will detect the cautery current, the grounding electrode for electrocautery should be placed as far away from the pulse generator as possible. Additionally, it is advantageous to employ electrocautery in brief bursts and to keep the current as low as possible, particularly if the pulse generator is nearby. Electrocautery should only be used with minimal EMI [3[(electromagnetic interference) (bipolar cautery or harmonic is to be used preferentially). If electrocautery is being used, the magnet should not be placed above a pacemaker in the operating room. Before surgery, rate responsive pacemakers should have their rate-responsive

mode turned off. To handle an emergency pacemaker malfunction, interim pacing should be made available in the OT. After the procedure, the pacemaker should be examined again for adequate operation and battery. Prior to anaesthesia, our patient's pacemaker was switched from DDDR to VOO mode, and heart rate was increased to 80 beats per minute. The anaesthetic technique should be applied in accordance with the patient's needs. Techniques for regional anaesthesia can be utilised successfully. Avoid situations where the pacemaker could be inadvertently inhibited or stimulated. Examples include direct muscular stimulation, electroconvulsive therapy, suxamethonium fasciculations, myoclonic tremors, and skeletal myopotentials. If the pacemaker is temperature responsive, hypothermia or hyperthermia must be avoided. Shivering and fasciculations should also be avoided. To make sure that paced electrical activity is translated to mechanical systole, intraoperative patient monitoring involves the capability to detect pacing discharge by ECG monitoring. Facilities for backup defibrillation or pacing should be accessible. It should be recommended to surgeons to employ a bipolar cautery. To avoid pacemaker malfunction, a monopolar cautery pad must be placed close to the surgical site if bipolar cautery is not an option. If "temperature" rate-responsive pacemakers are employed, fluctuations in temperature must be prevented by maintaining a consistent level[4,5].

To prevent the dislodging of pacing leads after surgery, postoperative shivering should be minimised. Special care must be taken for surgical procedures involving monopolar electrosurgical units, such as lithotripsy[6], transurethral resection of prostate, magnetic resonance imaging[7], and electroconvulsive therapy. The pacemaker's settings should be returned to their original configuration postoperatively.

Conclusion

A thorough understanding of the indication for pacemaker insertion, the different pacing modes, and pacemaker programming is necessary for the anaesthetic management of patients with cardiac pacemakers who are scheduled for non-cardiac procedures. For geriatric obese individuals with serious comorbid illnesses, regional anaesthetic is a feasible alternative. For a device assessment regarding its optimal operation and battery life, a cardiologist should also be consulted. Preoperative planning for anaesthesia should take into account the patient's health. Invasive arterial pressure monitoring may be necessary in addition to conventional monitors. The older patient coming in for elective non-cardiac surgery who has a permanent cardiac pacemaker may benefit from regional anaesthesia under close observation. Optimization of the patient preoperatively, careful monitoring, acceptable pain relief, and good postoperative care is the key for successful management of these patients.

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