

EDITORIAL VIEW

Pace makers and intra operative monitoring

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ABSTRACT

More and more patients re coming to operating rooms for surgery, who have pace makers implanted in them due to various cardiac rhythm abnormalities. Sometimes a temporary pacemaker might have to be inserted even intraoperatively. Anesthesiologist is the guardian of the patient's life and wellbeing in this period, so he needs to have adequate expertise to identify the problems of cardiac rhythm abnormalities and the dynamics of pace making to provide optimum safety to the patient.

Key words: Pace maker; Pace making; Cardiac arrhythmias; Anesthesiologist

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Intrinsic system of pacing in the heart is partially influenced by autonomic nervous system. Abnormal electrical impulse and conduction results in cardiac arrhythmias and compromising cardiac output.

Artificial cardiac pace makers are the size of a watch dial and weigh about 30 grams and have leads that carry information of cardiac rate and rhythm, sensed by sensors in the pace maker.

Dr. Ake Senning implanted first pacemaker in human in 1958, which lasted only for a few hours. Since then there has been a remarkable evaluation in technology of cardiac pace makers that includes development of single chamber, dual chamber and cardiac resynchronization devices. Temporary pacemakers are used for short period in emergency to rescue or in postoperative heart block so that native pace maker be recovered.

Many anesthesiologists caring for patients with pacemakers lack the knowledge and experience, and are unable to manage these patients intraoperatively. There have been several consensus recommendations to promote safe management of these patients and avoid likelihood of adverse outcome.¹⁻³

In situations when multidisciplinary help is not available and the anesthesiologist provides intraoperative management, he or she must be familiar with basics of pacemaker technology.

Most of the patients who have cardiac pacemaker may have some degree of myocardial dysfunction or might have had cardiac surgery. Intraoperative monitoring of patients will depend upon pre-operative cardiovascular evaluation of patients with pacemakers.⁴

During surgery ECG and pulse oximeter provide information to evaluate pacemaker function. During regional and general anesthesia all anesthetic agents has been used safely in patients with pacemakers. Any planned anesthetic technique should not be altered in the presence of device. Demand-mode pacemakers may interpret shivering or other movement i.e. succinylcholine induced fasciculations and electrical interference as intrinsic cardiac activity.^{4,5}

The major concern in operating room is electromagnetic interference (EMI) and diathermy is the most common source. In such conditions placing a small magnet over pacemaker generator changes the pacemaker from demand to fix rate pacing. Use of bipolar diathermy is safe, and if conventional diathermy is required, then diathermy pad should be placed so that current passes away from the pacemaker. The use of nitrous oxide in recently implanted pacemaker should be avoided because it causes expansion of gas in pocket that causes loss of anodal contact and pacemaker malfunctioning.^{4,5}

Magnet induced asynchronous pacing may result in theoretical risk of ventricular fibrillation. In modern pacemakers the switch over to asynchronous pacing is coupled with next cardiac cycle to avoid this.

In operating rooms some ECG monitors offer pacemaker mode for evaluating the ECG complexes. These provide filters to remove electrical artifacts and helps to enhance the pacemaker signal and prevent double counting of heart rate i.e. pacemaker spike and QRS complex.⁵

For Intraoperative pacemaker evaluation continuous invasive arterial pressure monitoring is not required, except in patients with severe heart failure to monitor beat to beat blood pressure monitoring and where loss of AV synchrony may result hemodynamic compromise. The availability of a pacemaker technician /programmer should be available.⁶

It is estimated that 50 – 70% of all patients with pacemakers, in their life time, may need at least

one MRI examination, so it is recommended that MRI compatible pacemakers be used. Regarding monitoring in such patients if general anesthesia/sedation is required, all those measures should be taken which are suggested for an MRI suit.

There are certain factors which alter threshold of cardiac pacemaker, i.e. hyperkalemia, hypokalemia (hyperventilation, which changes serum potassium level), arterial hypoxemia, myocardial infarction, catecholamines. Intraoperatively use of mandatory monitors, (end tidal CO₂, FiO₂, SpO₂, ECG and NIBP) help to detect changes and optimized threshold of pacemakers.

It is important that anesthesiologist obtains as much information regarding patients' disease process and pacemaker implanted as possible, and use intraoperative monitoring including invasive monitoring to help identify the problems and their speedy management.

Conflict of interest: None

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