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Use of Harmonic Scalpel as an Alternative to Electrocautery in Patients with Cardiac Pacemakers in Laparoscopic Cholecystectomy

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Abstract: ***The use of electrocautery during surgery in patients with permanent cardiac pacemaker in situ can lead to pacemaker malfunction with potentially grave consequences. The use of unipolar electrocautery during surgery with permanent pacemaker may result in electromagnetic interference which can lead to complete asystole; pacemaker can either revert to the default program with pacing rate that is unable to maintain adequate cardiac output in particular patient; increase pacing threshold secondary to electromagnetic coupling with resultant endocardial thermal burns or irreversible loss of battery output. To overcome this problems with bipolar electrocautery preventive measures such as restricting electrocautery use to greater than 15 cm from the pulse generator, placing the grounding pad as far from the pacemaker as possible and reprogramming the pacemaker to an asynchronous or magnet mode before the electrocautery use. However all this measures are insufficient and can lead to adverse outcome sometimes. So here we tried a harmonic or ultrasonically activated scalpel which provides hemostasis without any electromechanical interference in patients with permanent cardiac pacemakers for laparoscopic cholecystectomy.***

Keywords: laparoscopic cholecystectomy, pacemaker, harmonic scalpel

1. Case

A 70 year old female patient with GB calculi having cardiac pacemaker in situ in view of 2:1 atrio-ventricular block was planned for laparoscopic cholecystectomy. Because of the above mentioned adverse events with the use of electrocautery, harmonic scalpel was used throughout the cholecystectomy .

Thorough pre-operative cardiovascular and respiratory assessment done to check the patient's fitness for the surgery. Just before starting the surgery dual chamber synchronous pacemaker mode 'DDD' was changed to asynchronous mode 'VOO' and pacemaker rhythm was set to 100/min. patient was observed for any abnormalelectro-cardiac activity before the induction. harmonic scalpel was used during dissection of calot's triangle and during dissection of gall bladder from cystic plate. Surgery was completed using harmonic scalpel without any adverse cardiac events. Patient was extubated from general anesthesia without any complications. Again pacemaker mode was changed from asynchronous 'VOO' mode to synchronous mode 'DDD'. Patient was monitored in the immediate post operative period and it was uneventful.

2. Discussion

The dangers of using electrocautery in patients with cardiac pacemakers are well documented in various literatures. (1-8). Even if we take some precautions with electrocautery still there are chances of some catastrophic events including failure of pacemaker(9-11).Previously it was our routine practice to use bipolar electrocautery in patients with pacemaker after changing the mode of the pacemaker to asynchronous mode with an external pacing device. It is observed and well proved that bipolar is not that much effective in controlling bleeding as compared to unipolar and that is where use of harmonic scalpel as a energy source for controlling bleeding comes with the very promising results in such patients with in situ cardiac pacemakers.

An ultrasonically activated scalpel popularly known as a harmonic scalpel was successfully used without causing electro-magnetic interference on the surface electrocardiogram, pacemaker inhibition and pacemaker programming. It is also observed that there is no any adverse electrical effect on the pacemaker and no any change in the pacing and sensing characteristics of the pacemaker after using harmonic scalpel. since no detectable current flows in the patient at any time this instrument in patients with cardiac pacemaker in situ, electrical interference with the pacemaker/ICD is completely avoided.(12)

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