Case Report

Use of Monopolar Electrocautry in Transurethral Resection of Prostate (TURP) in the presence of Permanent Cardiac Pacemaker

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Abstract

A 75 years old man having a permanent pacemaker (PPM) presented to the Department of Urology Allied Hospital Faisalabad, with severe lower urinary tract symptoms. On history he had strangury, burning micturition, dysuria and hematuria. His International Prostate Symptom Score (IPSS) was severe (29 out of 35). On Digital Rectal Examination (DRE) there was a moderately enlarged prostate with firm consistency. On ultra-sonography prostate size was about 40gm. Transurethral resection of prostate (TURP) was planned. Due to PPM it was hazardous to use monopolar electrocautery in TURP. Indifferent electrode plate of diathermy was placed under the gluteal region bypassing the chest (heart and pacemaker) to remain the circuit in limited area. During surgery no fluctuation in blood pressure and no any extra ECG changes were found on cardiac monitor. Peroperative procedure and postoperative recovery was uneventful.

CASE REPORT

A 75 years old man resident of Faisalabad presented to the Department of Urology Allied Hospital Faisalabad, with severe lower urinary tract symptoms. Permanent pacemaker (PPM) was installed to the patient in Jeddah, Saudi Arabia, 20 years back. Record was not available. During this period battery or permanent pacemaker had not been replaced. Three months ago, permanent pacemaker was reinstalled by cardiologist in Faisalabad Institute of Cardiology. The pacemaker was buried in the pocket superficial to pectoral fascia and set at the rate of 66/min. Blood sugar, blood urea and serum creatinine were within normal range. HBsAg and Anti-HCV were negative. Hemoglobin level was 13.5g/dl. Blood pressure was 140/90 mmHg. Recent echocardiography showed that left ventricle of heart was in normal size with fair systolic and diastolic function. Ejection fraction was 55%. The assessment of cardiologist revealed normal biventricular function, pacemaker working well, and did not find any contraindication of surgery under spinal anesthesia and general anesthesia. On history he had strangury, burning micturition, dysuria and hematuria. His International Prostate Symptom Score (IPSS) was severe (29 out of 35). On Digital Rectal Examination (DRE) there was a moderately enlarged prostate with firm consistency. On ultrasonography prostatic size was about 40 grams. Cardiologist advised to precede surgery with the application of monopolar diathermy after ensuring availability of temporary pacemaker and monitoring by the cardiologist during surgery. Patient refused for temporary pacemaker. Surgery (TURP) was done under sedal block by using monopolar electrocautery. Indifferent electrode plate was placed under the gluteal region bypassing the chest (heart and pacemaker) to remain the circuit in limited area. During surgery no fluctuation in blood pressure and no any extra ECG changes were found on cardiac monitor. The functioning of pacemaker was not influenced by monopolar diathermy. After the 40 minutes, TURP was completed. And the patient was taken to the recovery room awake and in good condition. Patient was discharged on third postoperative day with uneventful recovery.

DISCUSSION

The modification of pace maker behavior by electromagnetic activity in the environment has been

extensively documented[1-4]. It is a great challenge to use monopolar electrocautery in TUR procedures in patients with pacemakers. Fein[5] reported three procedures of transurethral resection (TUR) with the use of electrocautery in patients with permanent pacemakers (PPM). He regarded the uneventfull outcome to well grounded permanent pacemaker and placing the electrode well below the level of pacemaker. So that, no current flows in the area of pacemaker. Finck and associates[6] declared the safety of TUR patients with permanent pacemaker. Electromagnetic interference in pacemakers has almost always been reported in association with the cutting mode of monopolar electrocautery and seldom in association with the coagulation mode. Abdelmalak and associates reported a case of electrocautery-induced electromagnetic interference with a DDDR pacemaker (DDDR is specific type of pacing with dual-chamber was paced, dual-chamber sensed, dual response to sensing, and rate modulated) in the coagulating and not cutting mode in spine procedure. Abdelmalak and associates discussed the factors which are affecting intraoperative electromagnetic interference. A 74-year-old man experienced intraoperative electromagnetic interference that resulted in asystole due to surgical electrocautery in the coagulation mode while placing electro-dispersive pad at different locations and distances from the operating site (this electromagnetic interference did not occur during the use of the cutting mode). However, because of careful management, the outcome was uneventful. Anesthetist should be aware that the coagulation mode of electrocautery can cause electromagnetic interference and hemodynamic instability. Heightened vigilance and preparedness can ensure a favorable outcome[7]. Patients with permanent cardiac pacemaker can undergo transurethral procedures[8].

Transurethral electro-resection of prostate and bladder in patient with cardiac pacemaker showed no higher risk in comparison with other patients as long as preoperative and postoperative monitoring was strictly performed. Monitoring of intraoperative blood loss as well as use of cardiac monitor, which showed no disturbances using high frequency current is essential for the intraoperative control. At department of Urology, University hospital *rechts der Isar*, Munich, Germany, 33 patients with cardiac pacemaker underwent transurethral resection without any complication[9]. Jain[10] et al also emphasized use of control venous pressure line for estimation of preload and careful titration of anesthetic drugs to maintain hemodynamics.

Surgical diathermy assimilate electro-coagulation and electro-resection, using current in the radiofrequency range of 500 to 2500kc./sec. The electric current of diathermy enters the patient at the active electrode, passes through the tissues, and then returns to the diathermy unit via the large indifferent electrode. The electric current is not limited to the tissues inter-posed between the two electrodes of diathermy, but the current spreads out and penetrates the entire body of the patient [ll]. This stray current may be detected by the demand pacemaker, and interpreted as spontaneous cardiac activity. The use of properly grounded instruments and placing the large indifferent electrode low on the body of the patient minimize, but do not eliminate the hazards of TUR electrocautery[12].

SUMMARY

Placing the indifferent electrode nearest to the active electrode i.e. surgery site and far from the heart and permanent pacemaker (PPM) reduces but do not diminish the hazards of monopolar electrocautery. This is a case in which the transurethral prostatectomy was done, utilizing monopolar diathermy of a patient having permanent pacemaker. Indifferent electrode plate of diathermy was placed under the gluteal region bypassing the chest (heart and pacemaker) to remain the circuit in limited area. During surgery no fluctuation in blood pressure and no any extra ECG changes were found on cardiac monitor.

REFERENCES

1. Lichter I, Borrie J, Miller WM. Br Med J. 1965; 12:1:1513-8.
2. Lefemine AA. Cardiac pacemakers. Anesthesiology 1966; 27:843-857.
3. Furman S, Parker B, Krauthamer M, et al: The influence of electromagnetic environment on the performance of artificial cardiac pacemakers. Ann Thorac Surg 1968: 6:90-95
4. Smyth NPD, Keshishian JM, Hood OC, et al. Effect of an active magnetometer on permanently implanted pacemakers. JAMA 1972; 221: 162-166.

5. Fein RL. Transurethral electrocautery procedures in patients with cardiac pacemakers. JAMA 1967; 202:101-109.
6. Finck AJ, Frank HA, Zoll PM. Anesthesia in relation to permanently implanted cardiac pacemakers. Anesth & Analg 1969; 48:1043-1051.
7. Abdelmalak B, Jagannathan N, Arain FD, Cymbor S, McLain R, Tetzlaff JE. Electromagnetic interference in a cardiac pacemaker during cauterization with the coagulating, not cutting mode. J Anaesthesiol Clin Pharmacol. 2011; 27:527-30.
8. Ji HX, Zhang JH, Song B, Jin XY. [Transurethral resection of the prostate for patients with the permanent cardiac pacemaker]. [Article in Chinese] Zhonghua Nan Ke Xue. 2005; 11:530-1, 535.
9. Schutz W. [Transurethral electro-resection in patients with cardiac pacemakers (author's transl)].[Article in German] Urologe A. 1979; 18:247-9.
10. Jain A, Jain K, Bhagat H, Mangal K, Batra Y. Anesthetic management of a patient with hypertrophic obstructive cardiomyopathy with dual-chamber pacemaker undergoing transurethral resection of the prostate. Ann Card Anaesth. 2010; 13:246-8.
11. Starmer CF, McIntosh HD, Whalen RF. Electrical hazards and cardiovascular function. New Eng J 1971; 284:181-186.
12. Samuel M. Lerner Suppression of a Demand Pacemaker by Transurethral Electrocautery. Anesth Analg September/October 1973; 52:703-706.

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