

Peri-Operative Artfactual ST Segment Changes in ECG with the Use of Electro-Cautery in Patient with Cardiac Disease

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ABSTRACT

ECG monitoring plays pivotal role in managing the patient in operation theatre during surgery and is one of the important monitor among ASA monitoring. On the hand the use of electrocautery is quite common in operative room by surgeon that causes interference in ECG waveform. Sometime such interference leads to error in diagnosis and results in unwanted diagnostic as well as therapeutic intervention. We are reporting one such case that demonstrates artifactual change in ECG by electrocautery.

Keywords: ECG, Cardiac Disease, Bipolar Electrocautery, Operation Theatre.


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INTRODUCTION

Continuous five lead electrocardiogram (ECG) monitoring is included under ASA standard of monitoring and it provide basic standard of care perioperatively. Continuous ECG monitoring in operation theater along with clinical assessment of patient can prevent the misdiagnosis of artifacts generated by internal external sources which is very important, because wrong diagnosis of these artifact leads to unwanted diagnostic and therapeutic intervention for arrhythmia¹. One such artifactual changes in electrocardiogram by interference with electrocautery has been described in this case report

CASE REPORT

A 70 year old female patient was a case of endometrial adenocarcinoma scheduled for staging laparotomy. During her pre-anaesthetic checkup she was found hypertensive from last 3years and on irregular medication and her ECG had shown ST wave changes and LVH. Cardiology opinion was taken in view of hypertension and ECG changes. 2D Echo revealed moderate concentric LVH, mid diastolic dysfunction with ejection fraction of 45 to 50 percent and started with telmasartan 40mg. There were no other comorbidity and patient was cleared for surgery under high risk. Other preoperative investigations were within normal range. After premedication with rantanidine 150mg and alprazolam 0.25mg and confirming 8hrs fasting patient was taken

into operation room, then basic standard ASA monitors (ECG, NIBP, SPO2) was attached. Intravenous line was secured with 16G cannula. Pre-induction invasive arterial line was secured under local anaesthesia in left radial artery. Her baseline vital was heart rate 76per minute, invasive Bp was 130/86 and saturation was 98% and electrocardiogram was showing t wave inversion in lead II. Surgery was planned under general anaesthesia with endotracheal intubation. Patient was induced with morphine 1microgram/kg and propofol 2mg/kg, injection vecuronium 1mg/kg was given after confirmation of bag and mask ventilation. Inj.xylocard1.5 was given 90sec before intubation to prevent the intubation response. Then, intubation was done with 7.5 cuffed endotracheal tube without significant change in blood pressure and heart rate, after confirming bilateral air entry tube was fixed at 21cm. After this, surgery started and when surgeon used bipolar cautery, there were significant changes were noted in lead 11 and V5 (FIG. 1and 2).these changes occurred every time on using bipolar cautery and disappeared immediately when cautery is stopped. However during these ST wave changes in ECG the patient remain hemodynamically stable and no need of any intervention was required to terminate the event. Immediately after surgery got over and patient was extubated 12 lead ECG and echocardiography was done which was normal, even troponin T and I was also normal 6 hours after surgery.



Fig.1.A and B showing rhythm in lead 11 and V5 respectively along with invasive blood pressing tracing and saturation and capnographic wave form during the period without use of cautery.

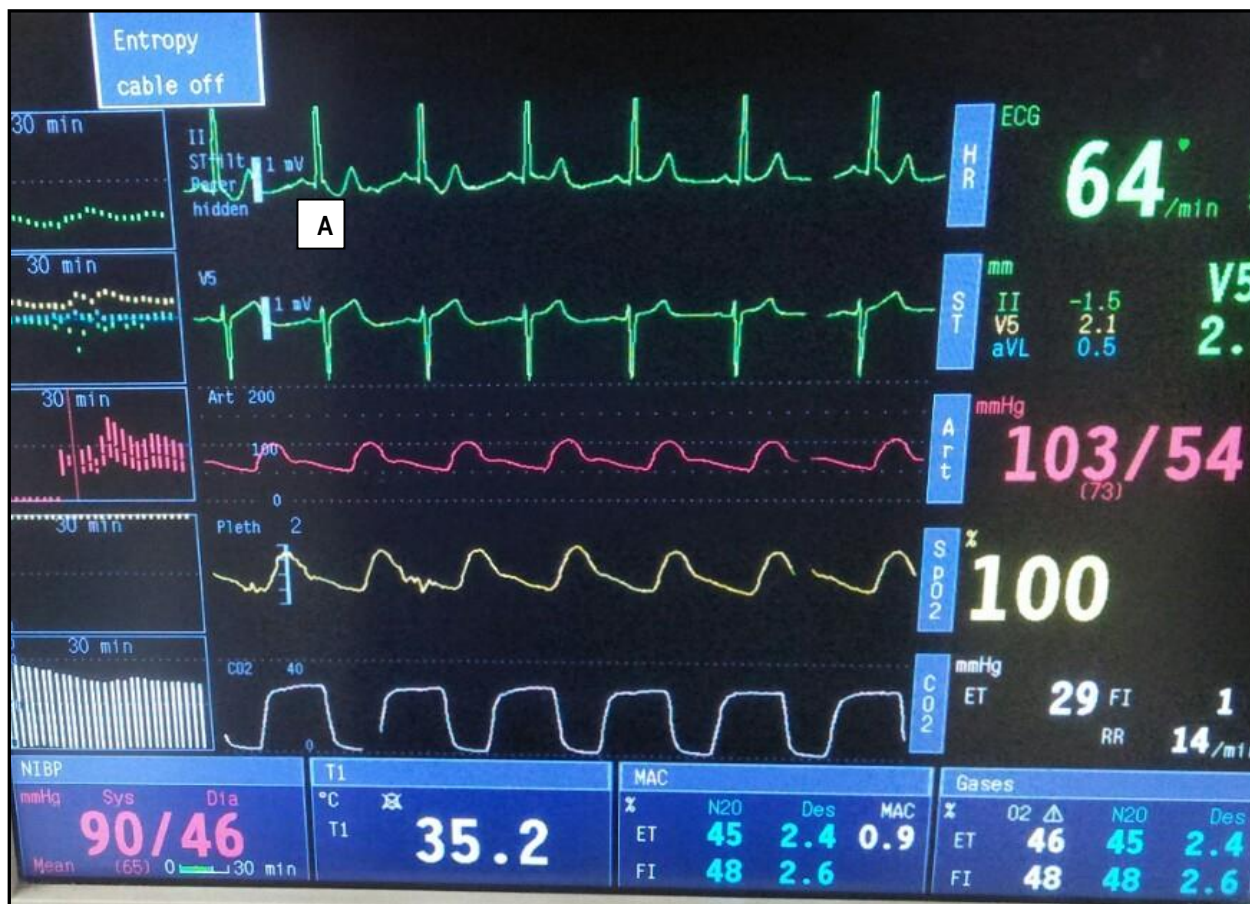


Fig.2: Showing ECG having ST wave changes in lead 11

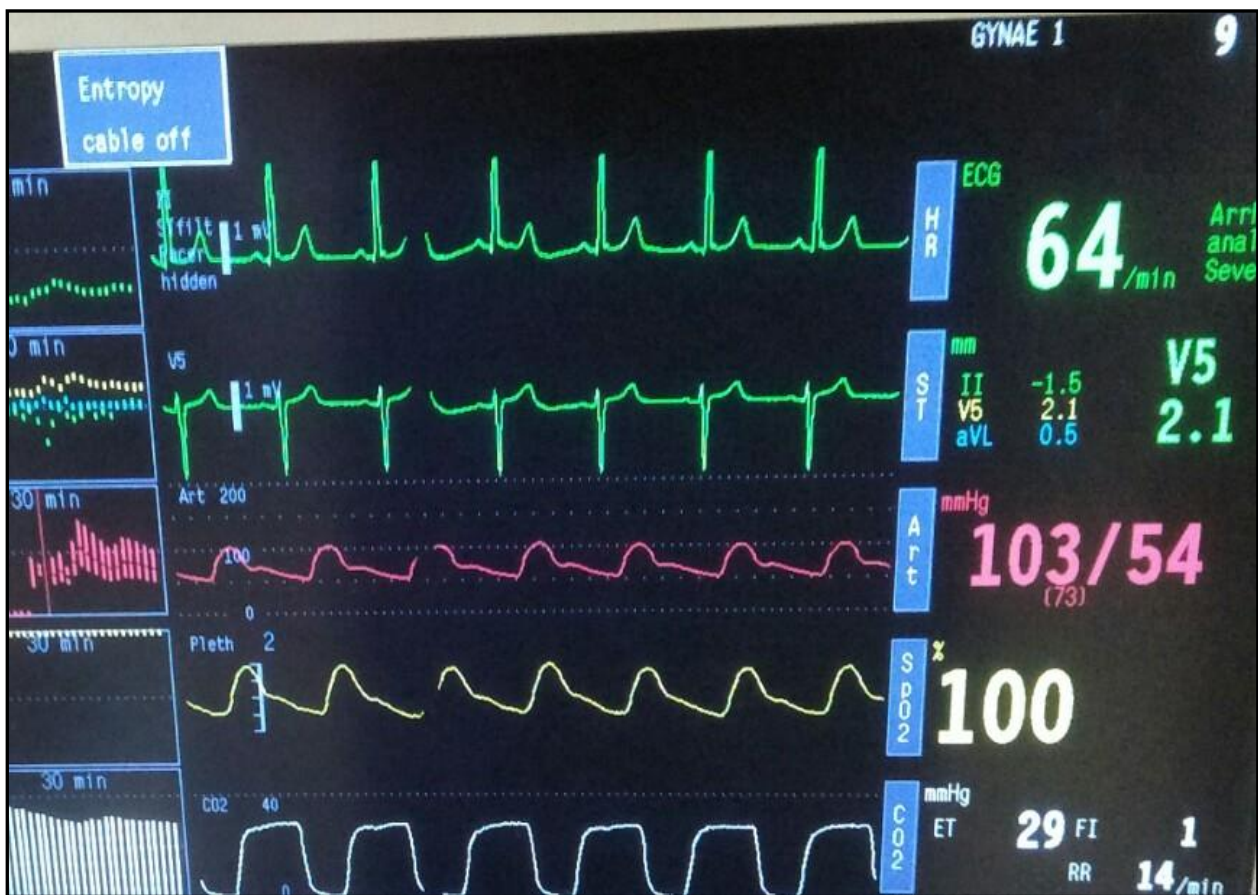


Fig 3: Showing ECG having ST wave changes in lead 11 and V5

DISCUSSION

Few case reports had highlighted the ST segment changes induced by electrocautery in patient with cardiac disease, like case report by Ketchey et al² electrocautery interference with electrocardiogram mimicking ST segment depression. Other case has been reported by Jain et al³ Electrocautery induced ST-segment depression in patient with CAD. Usually artifacts develop during intraoperative ECG monitoring and these are insignificant clinically and recognized easily. But sometime these artifacts appear unexpectedly and create a lot of confusion and leads to inappropriate diagnostic as well as therapeutic interventions. This was reported by Knight et al¹ clinical consequences of electrocardiographic artifacts mimicking ventricular tachycardia in which there was placement of permanent pacemaker and internal cardiac defibrillator arising out of ventricular tachycardia.

Our patient was American Society of Anesthesiologist status (ASA) 11 with high risk for intraoperative cardiac event like myocardial infarct and arrhythmias. Keeping in mind this risk, the ECG electrodes were placed at far away from electrosurgical unit current return pad which was placed over the posterior side of thigh. In addition to this, the ECG monitor was continuously and routinely used without occurrence of similar event in other cases. However exact mechanism for such type of event is obscured, but hypothetically the intrinsic vector of heart interact and combine with the electromagnetic vector produced from bipolar cautery² leads to such type of artifacts give better explanation logically. Although we have no mechanism for this occurrence, but we suspect that the electromagnetic vector created by the bipolar

electrocautery combined with the heart's intrinsic vectors could produce such an artifact on the ECG tracing. The main drawback of misdiagnosed artifacts is unjustified or wrong interventions for diagnosis as well as treatment. If such false arrhythmias go unrecognized and untreated, they might get included in medical record and become a source of confusion and misdiagnosis in long term. In order to avoid such mishappening technological standard and quality of medical devices should be to the level specified by national and professional organizations. Periodic professional maintenance for operational and electrical safety, of not only the electrocardiographic monitors but all the electrical equipment in the operating room and ICU, remains essential. Other general measure like appropriate skin preparation, electrode and lead placement, and vigilance against broken or misplaced leads, low batteries, or unplugged monitors must be corrected by the perioperative physician before any therapeutic intervention for arrhythmia. Loose electrodes (e.g., application of sterilizing prep solutions) will cause impedance imbalance and ultimately will decrease the system's common-mode rejection capabilities. Although ECG related artifacts have been reviewed earlier to some extent.⁴⁻⁷ But still there is deficiency of detailed and contemporary review of equipment-related artifacts.

CONCLUSION

We suggest that anaesthesiologist must take into consideration the artifacts induced by electrocautery in case of perioperative intermittent and reproducible ST-segment changes.

REFERENCES

1. Knight BP, Pelosi F, Michaud GF, Strickberger SA, Morady F: Clinical consequences of electrocardiographic artifact mimicking ventricular tachycardia. *N Engl J Med* 1999; 341:1270–4.
2. Ketchey C, Goldschlager N, Tang J, Young WL. Electrocautery interference with intraoperative electrocardiogram mimicking ST segment depression. *J Electrocardiol* 2009;42:425.
3. Jain A, Makkar JK, Mangal K. Electrocautery-induced artifactual STsegment depression in a patient with coronary artery disease. *J Electrocardiol* 2010;43:336–7.
4. Stevenson WG, Maisel WH. Electrocardiography artifact: what you donot know, you do not recognize.*Am J Med* 2001;110:402–3.
5. Moller JH, Anderson RC. Electrocardiographic artifacts. *Hosp Med* 1975;11:78–87.
6. Artifact in the OR *Health Devices* 1991;20:140–1.
7. Drew BJ. Pitfalls and artifacts in electrocardiography. *Cardiol Clin* 2006;24:309–15.

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