

Transesophageal echocardiography probe shutdown in a patient with hyperthermia

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Abstract

The use of transesophageal echocardiography (TEE) has been increasing over the past few years. It is considered a semi-invasive monitor and a safe diagnostic device. Though complications are rare, they must be known to operators who frequently perform TEE. TEE probes are known to cause tissue heating and damage on prolonged use. In this case report, we describe shutdown of the transesophageal probe in our patient with high-grade fever.

Keywords: Hyperthermia, Intensive Care Unit, transesophageal echocardiography

Access this article online

Website: www.ijccm.org

DOI: 10.4103/0972-5229.173692

Quick Response Code:



Introduction

Apart from use in operative cases and cardiac laboratories, transesophageal echocardiography (TEE) is now being increasingly used in critical care units. The complications with its use are primarily related to gastrointestinal, cardiovascular, and respiratory systems along with some miscellaneous problems related to probe insertion, drugs, and inexperience of the operator.^[1] TEE is routinely done in patients with fever, especially infective endocarditis. However, there has been no report of probe shutdown in such cases. Our case report does not describe a complication due to TEE *per se*, but a unique clinical situation, which has not been reported previously.

Case Report

A 55-year-old male, with chronic liver disease, long-standing diabetes mellitus, and obesity (body mass index of 30), was admitted to the Intensive Care Unit (ICU) with altered sensorium, upper gastrointestinal bleed, and

hemodynamic instability. His Child-Turcotte-Pugh score was seven. He was intubated and put on ventilatory support for airway protection. An upper gastrointestinal endoscopy showed bleeding from a gastric varix which was appropriately controlled. There were no esophageal varices. His hemoglobin was stabilized to 12 g% after transfusion of packed red blood cells.

Despite control of bleed, the patient required rapid escalation of vasopressors over several hours. He had developed fever after 24 h of ICU admission. He developed a temperature of 39°C (axillary temperature) with circulatory shock and increasing lactate levels. His 24 h culture (blood, urine, and mini bronchoalveolar lavage) reports sent on ICU admission were sterile. He developed atrial fibrillation, which required cardioversion. His bedside echocardiogram showed a very poor window with a provisionally normal report.

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How to cite this article: Saluja V, Singh G, Pandey C. Transesophageal echocardiography probe shutdown in a patient with hyperthermia. *Indian J Crit Care Med* 2016;20:50-1.

In view of long-standing diabetes mellitus, obesity, and poor transthoracic images, a bedside TEE was planned to rule out a cardiac cause of poor hemodynamics.

After appropriate consent, the transesophageal probe (MyLab™ 30Gold Esaote, TE 022) was inserted orally into the esophagus. It was examined physically for any defects before insertion. Within seconds of the probe insertion, the TEE monitor showed a rapid rise in temperature to 42.5°C. The probe stopped functioning, indicating a high temperature. The examination was withheld and a cold saline lavage was given through the nasogastric tube to reduce the local temperature. The lavage reduced the local temperature down to 38°C after which examination was resumed. After obtaining images for 5 min, there was a rise in temperature and the above procedure was repeated twice before we could satisfactorily complete the examination. The probe was re-examined after removal to rule out any mechanical damage.

Discussion

Esophageal heating and potential injury can occur from piezoelectric crystal vibration within the transesophageal probe tip or by direct tissue heating from absorbed ultrasound energy.^[2,3] Esophageal thermal injury has been reported in patients with severe atherosclerotic cardiovascular disease in whom the esophageal circulation was presumed to be compromised.^[3] Therefore, TEE probes have a thermocouple to monitor transducer tip temperature and an automatic shutdown mechanism when a critical preset temperature (42–46°C) has been reached.^[4]

TEE has been described in literature in patients with fever, most commonly in suspected bacterial endocarditis.^[5,6] The manufacturer guide does mention that the thermal limit can be reached in patients with fever.

However to our knowledge, this is the first case report describing shutdown of the probe due to increased body temperature of the patient.

In our patient, the probe stopped functioning immediately on entering the esophagus in the presence

of high temperature and resumed functioning after a cold saline lavage. The stomach lies in close proximity to the liver and inferior vena cava, gastric lavage is a reasonable method to rapidly cool hyperthermic patients. A core temperature reduction of approximately 0.15°C/min can be achieved using this method.^[7] We could complete our examination because of intermittent cold saline lavages which were given through the nasogastric tube.

It would have been ideal if we had anticipated such a problem before probe insertion. Active measures would have reduced the body temperature, and we could have completed our examination within a shorter period of time. We would recommend that TEE in a critically ill patient with fever should consider such a possibility and appropriate preventive measures should be taken.

Future attempts should be made for refinement of probe technology so that the machine is able to differentiate in temperature rise within the probe versus the surroundings.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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