

## Capnography in the endoscopy suite: A necessity, not a luxury!

Sir,

We report a case of venous air embolism (VAE) in a 48-year-old female, suffering from locally advanced carcinoma gall bladder with obstructive jaundice, posted for endoscopic retrograde cholangiopancreatography (ERCP) in prone position under general anaesthesia (GA). The patient had a history of yellowish discoloration of the skin associated with itching for 2–3 months and clay-coloured stools for 2 months. Pre-procedure bilirubin levels were 23.7 mg/dL. Anaesthesia was induced with intravenous (IV) fentanyl, propofol and atracurium, and prone position was given after endotracheal intubation. An endoscopic sphincterotomy was performed, and contrast was injected followed by an air cholangiogram. A sudden drop in end-tidal CO<sub>2</sub> (EtCO<sub>2</sub>) from 60 to 8, hypotension and bradycardia were noted, followed by cardiac arrest [Figure 1]. VAE was suspected. The procedure was abandoned, the patient was made supine, nitrous oxide was stopped and the lungs were ventilated with 100% O<sub>2</sub>. The patient was resuscitated with Ringer's lactate, and cardiopulmonary resuscitation (CPR) was started. Adrenaline 1 mg IV bolus was given. Return of spontaneous circulation was achieved after four cycles of CPR. A central venous line was secured, but no air could be aspirated through it. The patient was shifted to the Intensive Care Unit, was haemodynamically stable and was extubated 5 h after this episode. Two days later, she underwent an uneventful percutaneous

transhepatic biliary drainage and was discharged home on the 14<sup>th</sup> day.

ERCP is a common procedure for the diagnosis and treatment of various pancreatic and biliary diseases. The complications following ERCP include post-ERCP pancreatitis, cholangitis, bleeding or perforation after sphincterotomy. Air embolism is a very rare endoscopic complication but possesses the potential to be severe and fatal.<sup>[1-5]</sup> The risk factors for an air embolism following an ERCP are previous interventions or surgeries of the bile duct system, transhepatic portosystemic shunts, percutaneous transhepatic biliary drains, blunt or penetrating trauma to the liver, sphincterotomy, metal stent placement, the inflammation of the bile duct or surrounding veins, hepatic abscesses or tumours, liver biopsy and insufflation of air with high pressure. Cholangioscopy with air insufflation directly into the bile duct appears to be a particularly strong risk factor for an air embolism.<sup>[1]</sup> Symptoms may be non-specific, and therefore, a high index of clinical suspicion for a possible air embolism is required.<sup>[1]</sup> VAE is a diagnosis of exclusion because air may be rapidly absorbed from the circulation as in our case while diagnostic tests are being arranged. EtCO<sub>2</sub> monitoring, echocardiography, pulmonary artery catheterization and computed tomography scan are some of the aids in establishing the diagnosis of VAE.

Management includes (1) immediate cessation of the procedure, (2) administration of high flow 100% oxygen, discontinuation of N<sub>2</sub>O, (3) high volume normal saline infusion and (4) Trendelenburg and left lateral decubitus position. Other manoeuvres include air aspiration through a central venous catheter, hyperbaric oxygen therapy, cardiopulmonary



Figure 1: Monitor picture showing a fall in the end-tidal CO<sub>2</sub> and haemodynamic parameters

resuscitation (CPR) if haemodynamic collapse.<sup>[1]</sup> In the event of circulatory collapse, CPR should be initiated to maintain the cardiac output and to break large air bubbles into smaller ones and force air out of the right ventricle into the pulmonary vessels.<sup>[1]</sup>

We stress the importance of capnography here, for successful diagnosis of VAE which is an uncommon complication following ERCP in the endoscopy suite.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**Jeson Rajan Doctor, Reshma Ambulkar,  
Rohit Patnaik, Jigeeshu V Divatia**

Department of Anaesthesiology, Critical Care and Pain,  
Tata Memorial Hospital, Homi Bhabha National Institute, Mumbai,  
Maharashtra, India

**Address for correspondence:**

Dr. Jeson Rajan Doctor,  
501, Divyalok, LD Ruparel Marg, Malabar Hill, Mumbai - 400 006,  
Maharashtra, India.  
E-mail: jesonrdoctor@gmail.com

**REFERENCES**

1. Donepudi S, Chavalitdhamrong D, Pu L, Draganov PV. Air embolism complicating gastrointestinal endoscopy: A systematic review. *World J Gastrointest Endosc* 2013;5:359-65.

2. Bisceglia M, Simeone A, Forlano R, Andriulli A, Pilotto A. Fatal systemic venous air embolism during endoscopic retrograde cholangiopancreatography. *Adv Anat Pathol* 2009;16:255-62.

3. Goins KM, May JM, Hucklenbruch C, Littlewood KE, Groves DS. Unexpected cardiovascular collapse from massive air embolism during endoscopic retrograde cholangiopancreatography. *Acta Anaesthesiol Scand* 2010;54:385-8.

4. Cha ST, Kwon CI, Seon HG, Ko KH, Hong SP, Hwang SG, et al. Fatal biliary-systemic air embolism during endoscopic retrograde cholangiopancreatography: A case with multifocal liver abscesses and choledochoduodenostomy. *Yonsei Med J* 2010;51:287-90.

5. Sisk JM, Choi MD, Casabianca AB, Hassan AM. Two cardiac arrests because of venous air embolism during endoscopic retrograde cholangiopancreatography: A case report. *A A Case Rep* 2017;8:47-50.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.IJA_406_17

**How to cite this article:** Doctor JR, Ambulkar R, Patnaik R, Divatia JV. Capnography in the endoscopy suite: A necessity, not a luxury!. *Indian J Anaesth* 2017;61:689-90.  
© 2017 Indian Journal of Anaesthesia | Published by Wolters Kluwer - Medknow

**“Quick Response Code” link for full text articles**

The journal issue has a unique new feature for reaching to the journal’s website without typing a single letter. Each article on its first page has a “Quick Response Code”. Using any mobile or other hand-held device with camera and GPRS/other internet source, one can reach to the full text of that particular article on the journal’s website. Start a QR-code reading software (see list of free applications from <http://tinyurl.com/yzlh2tc>) and point the camera to the QR-code printed in the journal. It will automatically take you to the HTML full text of that article. One can also use a desktop or laptop with web camera for similar functionality. See <http://tinyurl.com/2bw7fn3> or <http://tinyurl.com/3ysr3me> for the free applications.