

# Perioperative Carbon Dioxide Narcosis during ERCP: Report of Two Cases

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## ABSTRACT

Endoscopic Retrograde Cholangiopancreatography (ERCP) is a common diagnostic and therapeutic gastrointestinal intervention. It is gaining prominence and use because of low morbidity associated with it compared to surgical procedure. ERCP is usually conducted outside operating suite, with compromised position under deep sedation or General Anaesthesia (GA) without control of airway. We report development of CO<sub>2</sub> narcosis in two patients who underwent ERCP under general anaesthesia, for removal of biliary stone and biliary stenting. We also reviewed the available literature on administration of anaesthesia and monitoring for ERCP.

**Keywords:** Airway, Monitoring, Propofol, Total intravenous anaesthesia

## CASE-1

A 65-year-old ASA II, female was posted for ERCP under GA for Choledocholithiasis with cholangitis and chronic cholecystitis. The procedure was conducted under Inj. Propofol, Fentanyl, and Hyosine with spontaneous ventilation on supplemented oxygen. Patient was subjected to routine recommended monitoring i.e., ECG lead II, automated non-invasive blood pressure @5 minutes interval, pulse oxymetry, thoracic impedance respiratory monitoring and presence of a qualified anaesthetist with clinical monitoring of respiratory rate and depth. Forty minutes in the procedure patient had sudden bradycardia followed by asystole. She was resuscitated as per advanced cardiac life support protocols, intubated and ventilated. Arterial blood gas revealed severe metabolic acidosis and respiratory acidosis (pH-6.90, pCO<sub>2</sub>-108, PAO<sub>2</sub>-102, HCO<sub>3</sub> std-14.8). ECG revealed Right Bundle Branch Block (RBBB) with ST-T changes in leads v3-v6 with sinus tachycardia. Bedside echocardiogram showed symmetric septal dyskinesia with Left Ventricular Ejection Fraction (LVEF) 55%. Serial cardiac markers were normal. Patient got stabilised, extubated next day and discharged the day after.

## CASE-2

A 54-year-old ASA 1 male was posted for ERCP under GA for pain abdomen right hypochondrium, fever and jaundice. Procedure was performed under Ketofol (Propofol total 400 mg with ketamine 100 mg). Patient was monitored in the same manner as in case 1 which is standard in the hospital. It lasted for close to 60 minutes. Post procedure patient had delayed awakening and irritability. Patient was monitored in endoscopy room for next 30 minutes during which the Glasgow Coma Scale (GCS) deteriorated further. He was intubated in endoscopy room then shifted to ICU. Pre-intubation ABG sample reveals pH 7.10, pCO<sub>2</sub>-71, HCO<sub>3</sub>-22, PaO<sub>2</sub>-104 and BE-7.7. He was ventilated and managed accordingly. Patient was extubated after two hours of ventilation. He was shifted to ward on next day.

## DISCUSSION

The cases we report were relatively low risk, subjected to ERCP with CO<sub>2</sub> insufflation under GA with spontaneous respiration, without airway control and no capnography. This is a routine day care procedure in most of the hospitals. Both these patients had problems in perioperative period about 40 minutes and more in the procedure. Both these cases happened in relatively quick succession and had respiratory acidosis (CO<sub>2</sub> narcosis) as common finding. These cases raise three questions which should be considered by every anaesthetist conducting ERCP viz., use of air or carbon dioxide as insufflating gas, choice of anaesthetic technique for anaesthesia in ERCP and monitoring to be used in these cases.

CO<sub>2</sub> narcosis is a condition where depressed mental status, coma and death may occur due to decompensated hypercapnia. The early signs of CO<sub>2</sub> narcosis may be masked under sedation leads to delayed diagnosis, intubation, ICU transfer and obviously cost of treatment [1].

ERCP is a common diagnostic and therapeutic gastrointestinal endoscopic procedure. During this process the GIT was distended by insufflation of air and/or carbon dioxide. CO<sub>2</sub> insufflation during ERCP is considered to be associated with less risk of post-procedural complications, while no additional risk of CO<sub>2</sub> narcosis is reported with it [2]. Available literature comparing air with CO<sub>2</sub> as insufflating agent in GI endoscopic procedure shows comparable rise in ETCO<sub>2</sub> and respiratory complications, even in patients with co-existing respiratory diseases, no difference in rates of reversible respiratory depression or apnoea (air 3.5%, CO<sub>2</sub> 3.9%) [3,4].

ERCP provides an anaesthetist unique set of challenges, because the procedure is performed in prone/semi-prone position, associated with high risk of aspiration [2], presence of shared and unsecured airway, often in patients with significant co-morbidities, increasing length and complexity of procedure, need for higher depth of anaesthesia; some of these procedures are also performed on day care basis requiring early recovery. Most ERCP are also performed in remote locations away from operating suites. Most of these procedures are conducted under spontaneous breathing, without airway control [5].

The available literature on control of airway during ERCP is equivocal, with recent literature in favour of spontaneous ventilation [6,7]. This may be because of deep sedation that is possible with availability of Propofol [5,8]. Intubation is recommended in very exceptional cases [9]. Most common technique is based on use of Propofol administered as a bolus followed by an infusion or intermittent maintenance bolus with or without short acting opioid/ ketamine. Propofol dosing should be timed to coincide peak effect with endoscope insertion.

During Upper Gastrointestinal Endoscopy (UGIE) patient should be pre-oxygenated as well as supplemental oxygen should be provided. Monitoring of ETCO<sub>2</sub>, although recommended by the ASA is of questionable accuracy in patients on spontaneous respiration during upper GI endoscopy, because of lack of suitable gas sampling device [10].

Careful observation of clinical signs like chest movement, use of respiratory muscles, pattern and depth of respiration is of paramount importance along with continuous monitoring (including ECG, NIBP, and SpO<sub>2</sub>) [5,7]. The use of alternate means of ventilation monitoring

like acoustic respiratory monitor or impedance pneumogram to supplement clinical monitoring has been suggested to improve safety [4]. Many advanced endoscopic procedures can be safely conducted with this technique; however, endotracheal intubation might be a safer option in the hands of less experienced, especially for procedures like ERCP [5].

As both these cases occurred with CO<sub>2</sub> insufflation and procedure lasting beyond 40 minutes, we have started switching the insufflating gas from CO<sub>2</sub> to air, when the procedure lasts longer than 30 minutes, as a safety measure in the interim till we secure suitable sampling device for capnography.

## CONCLUSION

The scarce availability of suitable sampling device for ETCO<sub>2</sub> monitoring in most places may put patients at risk of CO<sub>2</sub> retention irrespective of control of respiration; especially with CO<sub>2</sub> being used as insufflation agent and if the procedure lasts long and one should be watchful for CO<sub>2</sub> retention.

## REFERENCES

- [1] Yang C, Xi J, Sheikh S, Hakim A, Nadella S, Dhital S, et al. A scoring system for prediction and risk stratification of CO<sub>2</sub> narcosis. *Emergency Med.* 2018;8:368. doi:10.4172/2165-7548.1000368.
- [2] Zhang WY, Jiang XP, Miao L, Chen FC, Huang ZM, Huang XL. Efficacy and safety of carbon dioxide insufflation versus air insufflation for endoscopic retrograde cholangiopancreatography: A meta-analysis update. *Clin Res Hepatol Gastroenterol.* 2017;41(2):217-29.
- [3] Dellon ES, Velayudham A, Clarke BW, Isaacs KL, Gangarosa LM, Galanko JA, et al. A randomized, controlled, double-blind trial of air insufflation versus carbon dioxide insufflation during ERCP. *Gastrointest Endosc.* 2010;72:68-77.
- [4] Muraki T, Arakura N, Kodama R. Comparison of carbon dioxide and air insufflation use by non-expert endoscopists during endoscopic retrograde cholangiopancreatography. *Dig Endosc.* 2013;25:189-96.
- [5] Goudra BG, Singh PM, Sinha AC. Outpatient endoscopic retrograde cholangiopancreatography: Safety and efficacy of anesthetic management with a natural airway in 653 consecutive procedures. *Saudi J Anaesth.* 2013;7:259-65.
- [6] Early DS, Lightdale JR, Vargo JR II, Acosta RD, Chandrasekhara V, Chathadi KV. Guidelines for sedation and anesthesia in GI endoscopy. *Gastrointestinal Endoscopy.* 2018;87(2):327-37.
- [7] Garewal D, Waikar P. Propofol sedation for ERCP procedures: A dilemma? Observations from an anesthesia perspective. *Diagnostic and Therapeutic Endoscopy.* 10.1155/2012/639190
- [8] Krugliak P, Ziff B, Rusabrov Y, Rosenthal A, Fich A, Gurman GM. Propofol versus midazolam for conscious sedation guided by processed EEG during endoscopic retrograde cholangiopancreatography: A prospective, randomized, double-blind study. *Endoscopy.* 2000;32:677-82.
- [9] Motia Y, Bensghir M, Jaafari A, Meziane M, Ahtil R, Kamili ND. Anesthesia for endoscopic retrograde cholangiopancreatography: Target-controlled infusion versus standard volatile anesthesia. *Annals of Gastroenterology.* 2016;29:530-35.
- [10] American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non Anesthesiologists. Practice guidelines for sedation and analgesia by non anesthesiologists. *Anesthesiology.* 2002;96:1004-17.

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