

The second consideration in including SpO₂ was that it is useful for the second airway provider, who may have just arrived to help, to know that there is still tissue perfusion. This will dictate how best to proceed especially if the other airway providers' experiences are unknown.

Most anaesthetists have been in situations where we may have had to take over airway management of a patient or have had airway management taken over in the emergency department or operating theatre. The subsequent management once help has arrived is usually successful in rescuing the situation. There are psychological reasons and technical reasons why the rescue airway provider may be a game changer providing situational awareness is maintained. When I am called to help, I have already decided that I am ready to perform eFONA. I assess the information given by the primary airway provider, and observe the environment and monitors, including SpO₂ and ETCO₂, to determine how to proceed. If the primary airway provider has tried all three supraglottic approaches and there is no wake-up option, I have one intubation attempt with a videolaryngoscope. If that is unsuccessful, then generally my plan is to progress to a video-assisted fiberoptic intubation if the SpO₂ is >90% or to eFONA if SpO₂ is <90% with our prepared point-of-care kits.

Ultimately, the final consensus opinion of the 2014 ANZCA Airway Management Working Group was that SpO₂ should be included.

Declaration of interest

The author was chair of the Australian and New Zealand College of Anaesthetists Airway Management Working Group.

References

1. Chrimes N, Higgs A, Rehak A. Lost in transition: the challenges of getting airway clinicians to move from the upper airway to the neck during an airway crisis. *Br J Anaesth* 2020; 125: e38–46
2. Australian and New Zealand College of Anaesthetists. Transition from supraglottic to infraglottic rescue in the “can't intubate can't oxygenate” (CICO) scenario. Report from the ANZCA airway management working group 2014. Available from: https://libguides.anzca.edu.au/ld.php?content_id=48540794. [Accessed 1 August 2020]
3. Australian and New Zealand College of Anaesthetists. Guidelines for the management of evolving airway obstruction: transition to the can't intubate, can't oxygenate airway emergency. ANZCA PS61 2017. Available from: <https://www.anzca.edu.au/getattachment/71f54974-314a-4d96-bef2-c03f39c8a8e9/PS61-Guideline-for-the-management-of-evolving-airway-obstructiontransition-to-the-Can't-Intubate-Can't-Oxygenate-air-wayemergency#page=> [Accessed 1 August 2020].

doi: 10.1016/j.bja.2020.09.007

Advance Access Publication Date: 3 October 2020

© 2020 British Journal of Anaesthesia. Published by Elsevier Ltd. All rights reserved.

Risks and outcomes of gastrointestinal endoscopy with anaesthesia in patients with pulmonary hypertension

Christopher Lai^{*}, Laurent Savale, Isabelle Boytchev, Xavier Jaïs, Olivier Sitbon, David Montani, Marc Humbert and Dan Benhamou

Bicêtre University Hospital, Assistance Publique-Hôpitaux de Paris, Le Kremlin-Bicêtre, France

^{*}Corresponding author. E-mail: christopher.lai@aphp.fr

Keywords: anaesthesia; endoscopy; perioperative complications; perioperative morbidity; pulmonary hypertension; right heart failure

Editor—Precapillary pulmonary hypertension (PH) is defined as a mean pulmonary artery pressure (mPAP) ≥ 25 mm Hg at rest coupled with a pulmonary capillary wedge pressure (PCWP) ≤ 15 mm Hg and an elevated pulmonary vascular resistance (PVR) >3 Wood units (WU).¹ A high risk of perioperative morbidity and mortality is observed after noncardiac and non-obstetric surgery. Retrospective studies including small samples have reported a complication rate of 6–42%,^{2–7} and a mortality rate up to 18%.³ Gastrointestinal (GI) endoscopy procedures are very commonly performed procedures and general anaesthesia or sedation is very often needed. However, no studies have evaluated the safety of GI endoscopy in patients with PH. The aim of our study was to

describe a cohort of patients with precapillary PH undergoing GI endoscopy requiring sedation or general anaesthesia and to report on complications and outcomes of these procedures.

This was a retrospective cohort study (with systematic sampling) of consecutive patients with precapillary PH undergoing GI endoscopy, between March 1, 2012 and November 30, 2017, at the French National Reference Centre for Pulmonary Hypertension (Paris-South University, Bicêtre University Hospital, Le Kremlin-Bicêtre, France). Multiple procedures in the same year for one patient were excluded. Skilled gastroenterologists (>10 yr of practice) performed all procedures. Anaesthetists assisted by nurse anaesthetists provided all sedation or anaesthesia procedures. Major complications were

recorded perioperatively and within 28 days after each procedure, and defined as hypotension requiring the use of a continuous catecholamine support (norepinephrine or phenylephrine), haemodynamically significant arrhythmia, right heart failure, or death. The most severe complication was reported. Patients with right heart catheterisation performed again in the following year had their data compared with preprocedural measurements. Data are presented as mean (standard deviation [sd]), and univariate analysis was performed to compare patients with and without complications.

Of 74 eligible GI endoscopy procedures performed in patients with precapillary PH during the study period (11 procedures were excluded because of repeated endoscopy within 1 yr), 37 procedures in 26 patients were performed with sedation or general anaesthesia (Supplementary Fig. S1). At the most recent clinical evaluation before endoscopy, patients had moderate-to-severe functional impairment, New York Heart Association (NYHA) functional class III or IV, in 24/37 (65%) of cases. The 6 min walking distance was <440 m in 19 of 26 patients (73%), with a mean of 349 (111) m. The last haemodynamic assessments with right heart catheterisation before endoscopy (median interval, 2 months; inter-quartile range, 0–7 months) are shown in Table 1. Most patients had specific medications for PH ($n=23/26$, 88%), including various combinations of drugs ($n=15/26$, 58%).

Of 37 procedures performed with anaesthesia, eight were esophagogastroduodenoscopy (EGD), 10 were colonoscopy, 12 were combined EGD and colonoscopy, and seven were endoscopic retrograde cholangiopancreatography (ERCP) (Supplementary Fig. S1). In 4/37 cases (11%), an emergency procedure was performed, including ERCP ($n=3$) for acute cholangitis and one EGD for GI bleeding. Most GI endoscopic procedures were performed using sedation ($n=31/37$, 84%), whereas 16% were done using general anaesthesia. After the procedure, 28/37 patients (76%) were hospitalised on a general

ward, and the others in an intensive care unit. Perioperative complications occurred in 21 (57%) out of 37 procedures. A major complication occurred in 5/37 procedures (14%), three during ERCP, one during EGD and one during colonoscopy. All these patients needed a continuous vasopressor infusion for hypotension during three endoscopic procedures (8%) and two (5%) patients for hypotension associated with arrhythmia. One patient developed an episode of acute right heart failure several hours after the procedure on day 0, an emergency ERCP in a patient with acute septic cholangitis. No patients died. Three of these major complications occurred during ERCP and two under general anaesthesia. The risk factors associated with major complications in univariate analysis were older age (odds ratio [OR], 1.32; $P=0.030$); emergency procedure (OR, 10.00; $P=0.022$) and ERCP (OR, 10.50; $P=0.037$; Table 1). There was no evidence of significant haemodynamic deterioration at follow-up (mean time interval, 5 [4–7] months). GI endoscopy without anaesthesia was performed in 29 patients, and among 37 procedures, no major complications were observed.

Our study reports a rate of cardiopulmonary adverse events in patients with precapillary PH higher than in the general population undergoing GI endoscopy. The cardiopulmonary event rate in ASA physical status 3 patients has been reported to be 1.8% in a US database comprising 324 737 GI procedures.⁸ Although no death was observed in our series, the incidence of major complications (14%) was in the lower range of what has been reported for surgical procedures in this population (6–42%).^{2–7}

The small sample size limited the capacity to identify risk factors for major complications and did not allow multivariate analysis to be performed. There are also limitations associated with a retrospective and single-centre study, albeit performed in the national reference centre. However, this allowed us to examine consecutive cases with a standard anaesthetic protocol. A much larger patient population and a prospective study would be required to better assess outcomes and risk

Table 1 Patient and procedure characteristics and univariate analysis of risk factors for major postoperative complications. 6MWD, 6 min walking distance; CI, confidence interval; ERCP, endoscopic retrograde cholangiopancreatography; mPAP, mean pulmonary artery pressure; NYHA, New York Heart Association; OR, odds ratio; PCWP, pulmonary capillary wedge pressure; PVR, pulmonary vascular resistance; RAP, right atrial pressure; WU, Wood unit.

Characteristics of patients	All patients ($n=37$)	No POC ($n=32$)	POC ($n=5$)	Univariate analysis		
				OR	95% CI	P
Age, yr (range)	62 (40–82)	60 (40–74)	71 (63–82)	1.32	(1.03–1.69)	0.030
Female sex, n (%)	18 (49)					
NYHA class						
I–II	13 (35)	11 (34)	2 (40)			
III–IV	24 (65)	20 (66)	3 (60)	0.91	(0.15–5.28)	1.00
6MWD (m)	349 (111)	344 (117)	371 (52)	1.00	(0.99–1.01)	0.62
Haemodynamic data						
mPAP (mm Hg)	43 (12)	43 (12)	40 (6)	0.97	(0.88–1.07)	0.555
RAP (mm Hg)	8 (3)	8 (3)	7 (3)	1.00	(0.79–1.27)	1.000
PCWP (mm Hg)	10 (3)	10 (3)	10 (2)	1.02	(0.73–1.44)	0.891
Cardiac index ($L \text{ min}^{-1} \text{ m}^2$)	3.0 (0.8)	3.1 (0.9)	2.5 (0.3)	0.24	(0.04–1.62)	0.144
PVR (WU)	6.1 (2.2)	6.0 (2.5)	7.1 (1.9)	1.19	(0.78–1.79)	0.421
Characteristics of endoscopic and anaesthetic procedures						
Anaesthesia						
Sedation	31 (84)	28 (87)	3 (60)			
General	6 (16)	4 (13)	2 (40)	4.67	(0.70–31.30)	0.182
Emergency procedure, n (%)	4 (11)	2 (6)	2 (40)	10.00	(1.26–79.47)	0.022
Duration procedure (min)	36 (22)	32 (16)	58 (32)	1.05	(0.99–1.10)	0.057
ERCP, n (%)	7 (19)	4 (13)	3 (60)	10.50	(1.57–70.44)	0.037

factors, but PH is a rare disease⁹ and the number of patients was already high because of the concentrating effect of the national reference centre. Finally, although our study population had well-established precapillary PH, mPAP was not very elevated, and right atrial pressure and cardiac index were not drastically changed, suggesting optimised treatment. Nevertheless, haemodynamic data are comparable with those in other surgical studies²⁻⁷. Still, the incidence of major complications is significant. We can only suspect that the risk of complications would be higher with more disturbed haemodynamic abnormalities and with less specialised care.

The present study provides data on the occurrence of complications associated with GI endoscopy in patients with precapillary PH, which should not be underestimated. The incidence of major complications was in the lower range of what is seen in non-cardiothoracic non-obstetric surgery, but their occurrence was circumscribed to the day of the procedure and short- and long-term outcomes were not modified. A multidisciplinary approach and a careful perioperative planning are likely important factors.

Declarations of interest

The authors declare that they have no conflict of interest.

Funding

Institutional sources, departmental sources, or both.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.bja.2020.09.017>.

References

1. Hoeper MM, Bogaard HJ, Condliffe R, et al. Definitions and diagnosis of pulmonary hypertension. *J Am Coll Cardiol* 2013; **62**: D42–50
2. Kaw R, Pasupuleti V, Deshpande A, Hamieh T, Walker E, Minai OA. Pulmonary hypertension: an important predictor of outcomes in patients undergoing non-cardiac surgery. *Respir Med* 2011; **105**: 619–24
3. Minai OA, Yared J-P, Kaw R, Subramaniam K, Hill NS. Perioperative risk and management in patients with pulmonary hypertension. *Chest* 2013; **144**: 329–40
4. Ramakrishna G, Sprung J, Ravi BS, Chandrasekaran K, McGoan MD. Impact of pulmonary hypertension on the outcomes of noncardiac surgery. *J Am Coll Cardiol* 2005; **45**: 1691–9
5. Price LC, Montani D, Jais X, et al. Noncardiothoracic non-obstetric surgery in mild-to-moderate pulmonary hypertension. *Eur Respir J* 2010; **35**: 1294–302
6. Lai H-C, Lai H-C, Wang K-Y, Lee W-L, Ting C-T, Liu T-J. Severe pulmonary hypertension complicates postoperative outcome of non-cardiac surgery. *Br J Anaesth* 2007; **99**: 184–90
7. Meyer S, McLaughlin VV, Seyfarth H-J, et al. Outcomes of noncardiac, nonobstetric surgery in patients with PAH: an international prospective survey. *Eur Respir J* 2013; **41**: 1302–7
8. Sharma VK, Nguyen CC, Crowell MD, Lieberman DA, de Garmo P, Fleischer DE. A national study of cardiopulmonary unplanned events after GI endoscopy. *Gastrointest Endosc* 2007; **66**: 27–34
9. Thenappan T, Shah SJ, Rich S, Gomberg-Maitland M. A USA-based registry for pulmonary arterial hypertension: 1982–2006. *Eur Respir J* 2007; **30**: 1103–10

doi: 10.1016/j.bja.2020.09.017

Advance Access Publication Date: 24 October 2020

© 2020 British Journal of Anaesthesia. Published by Elsevier Ltd. All rights reserved.

Pain-free day surgery? Evaluating pain and pain assessment during hysteroscopy

Richard Harrison¹, William Kuteesa², Atul Kapila², Mark Little², Wiebke Gandhi¹, Deepak Ravindran², Carien M. van Reekum¹ and Tim V. Salomons^{1,3,*}

¹School of Psychology and Clinical Language Sciences, University of Reading, Reading, UK, ²Royal Berkshire NHS Foundation Trust, Reading, UK and ³Department of Psychology, Queen's University, Kingston, ON, Canada

*Corresponding author. E-mail: ts119@queensu.ca

Keywords: ambulatory surgery; analgesia; day-case surgery; gynaecology; hysteroscopy; local anaesthesia; pain assessment

Editor—Hysteroscopy is a diagnostic gynaecological procedure traditionally requiring administration of general anaesthesia, but more frequently completed using local anaesthesia within a day-case (ambulatory) setting. Advantages associated with this transition include decreased completion times, fewer risks, and lower clinical costs.^{1,2} However, maintaining

patient satisfaction remains a high priority, as the risk of pain and discomfort is a primary concern.³ Multiple sources in the UK describe this procedure as non-painful, although this description is being challenged by public campaigns. Numerous services advertise the procedure as being either pain free or low pain; however, it is estimated that 25% of