Letter to editor
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Mesenteric Tear after Enteroscopy- Avoidable or Inevitable

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Dear Sir,

We would like to write on a 48-year-old lady, who presented for a retrograde enteroscopy for possible inflammatory bowel disease. She was unremarkable except for obesity (BMI = 35), well-controlled hypertension and a history of migraine. The procedure was performed under deep propofol sedation. It took less than 5 minutes to advance the scope to cecum. The Pediatric C*olonoscope (*PCF) scope was advanced to a depth of 120cm into the ileum. The procedure required two assistants to repeatedly apply and sustain pressure on the abdomen to facilitate advancement. There were episodes of hypertension requiring additional boluses of propofol, fentanyl and even intravenous beta blockers. The total duration of the procedure was 47 minutes. The patient woke up spontaneously, was hemodynamically stable and sufficiently alert for transfer to the recovery area.

In the recovery, she developed slight hypotension (systolic in the 80s) and tachycardia (heart rate in early 100s). Additional fluids were administered and a bolus of intravenous phenylephrine was given. The patient was complaining of pain in her upper abdomen. However, it was soft to palpate. Sepsis and bleeding were considered as possible causes. In the absence of aspiration or preexisting infection, sepsis was deemed unlikely. The patient continued to remain hypotensive despite additional fluids and further boluses of phenylephrine and ephedrine. Bleeding was strongly suspected, an additional IV cannula was placed, infusions of phenylephrine and epinephrine commenced and a stat Arterial Blood Gas (ABG) was obtained. ABG was unremarkable (normal lactate) other than a haemoglobin of 8 gm/dl. An expeditious transfer to the emergency room (where the Hb had dropped to 4.7 gm/dl) was followed by an emergency surgery. Approximately 3 litres of blood was evacuated from the abdominal cavity. A mesenteric artery tear was found and a ileocecectomy was performed. In addition, there was a small splenic laceration that was repaired with an argon beam.

In 2014 Werli *et al.* published their findings of a retrospective analysis of complications from colonoscopy with and without anaesthesia services[1]. A higher incidence of almost all complications including bleeding and perforation was reported. Fortunately, there were no deaths. Their findings were echoed in a similar study by Cooper *et al.*,[2]. In their retrospective analysis, there was a low absolute risk of complications; however, the frequency was higher in patients receiving sedation administered by anaesthesia providers, specifically, aspiration pneumonia.

Although bleeding complications are reported in such cases in medical literature, mesenteric artery tear is rare and limited to case reports[3]. Splenic injury is a far more common cause of massive bleeding requiring surgery[4]. Adhesions are likely predisposing factors. Those suffering from mesenteric vein tears, manifest with slowly appearing symptoms as a result of tear-related large hematoma. In our case, the symptoms manifested immediately and were sufficiently severe requiring immediate surgical intervention.

There is sufficient evidence to suggest that bleeding complications are higher with propofol deep sedation. This is likely to be related to multiple factors. When anaesthesia providers administer propofol sedation, the depth is similar to general and often deep general anaesthesia[5]. This is going to effectively remove any feedback from the patient. Additionally, to suppress the signs of pain and discomfort manifesting during the

procedure, anaesthesia providers administer additional doses of propofol, opioids and occasionally vasodilators and beta blockers. As a result, the endoscopist will continue to advance the scope and the assistants apply pressure without any cues that could alert them to their limits. It is quite likely that a combination of factors played a role in the bleeding complication sustained by the patient. The anaesthesia providers should alert the endoscopists of any indirect signs of undue pressure exerted on the abdomen that can potentially cause such bleeding complications. Measuring the depth of sedation is additional insurance in alerting undue deeper levels of anaesthesia.

Another consideration is the question of propofol for a routine colonoscopy which is a controversial and emotive subject. The practice varies across the United States of America. In general, propofol sedation, more popularly referred to as MAC (Monitored Anesthesia Care) is used more extensively in northeastern states than the western states. Other than the cost, many other variables dictate the frequency of MAC use. In the hospital of the University of Pennsylvania, we transitioned from "as needed" (mainly for advanced endoscopic procedures, about 30% of all cases) to "all procedures" in around 2015. There were many reasons for this, although the predominant push came from the gastroenterologists themselves. To pay the anesthesia providers for all-day services and utilise their services off and on during the day was seen as a waste of resources. The efficiency and throughput in the endoscopy centre are decidedly better with propofol sedation. Endoscopists are reluctant to take additional liability related to sedation without additional remuneration for the service. The younger generation of endoscopists are relatively inexperienced in moderate sedation and management of their complications. The procedure room nurses are uncomfortable with the additional role of administering sedative medications. Lastly, anaesthesia providers are unwilling to provide additional propofol sedation in the event of failed moderate sedation. Even though the failure rates of moderate sedation are low, they are unwelcome, especially for screening colonoscopies. It is impossible to predict the sedation requirements or possible failure in every patient specifically in the era of open endoscopy.

Studies have repeatedly shown that satisfaction rates among gastroenterologists and patients are higher with propofol sedation, especially when administered by anaesthesia providers[6,7]. This could be related to the deeper levels of sedation approaching the levels of general anaesthesia provided by anaesthesia providers. Complications such as hypoxia are higher among patients receiving sedation by anaesthesia providers for the same reason. However, recently many devices and drug combinations have been employed to diminish the rates of such complications. Some of the devices include the high-flow nasal cannula and the procedural oxygen mask. Drug combinations such as propofol-ketamine and propofol-dexmedetomidine might reduce the incidence of respiratory complications such as hypoxemia. Employing such techniques and drug combinations might render anaesthesia services even more inevitable, which is incomprehensible for many gastroenterologists and insurers.

In conclusion, although such a complication is rare, it is life-threatening. Anticipation and appropriate aggressive management are essential to prevent its fatal outcome. Titration of the depth of sedation and awareness of the potential harm of excess pressure on the abdomen is critical. Ongoing communication between the anaesthesia provider and the endoscopist may benefit both. The policy of universal deep sedation and the use of propofol sedation on an "as needed" basis needs to be avoided. Life threatening complications may occur during innocuous procedures and the health care providers should be prepared to deal with such an emergency. The issue of deep sedation for routine colonoscopy needs to be addressed more effectively. The availability of a relatively new sedative such as remimazolam in the near future could address some of the drawbacks of midazolam[8]. Oliceridine is yet another new non-sedative opioid that might revolutionise the routine endoscopy sedation practice[9]. Both are waiting for FDA approval.

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