

Corneal injury after routine gastrointestinal endoscopy with moderate sedation

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Abstract

We report a case series of 4 patients who underwent routine gastrointestinal endoscopy under moderate sedation and developed corneal injuries. Although corneal abrasion has been reported as the most common ocular complication during non-ocular surgery under general anesthesia, the risk for corneal abrasion during routine endoscopic procedures using moderate sedation has not been previously reported. Symptoms reported included ocular burning, scratchy sensation, redness, and pain reported post-procedure. Endoscopists and staff should be alert to the occurrence of this potentially serious complication, as this is paramount for its prevention, diagnosis, and management. Treatment of corneal abrasion includes referral to ophthalmology for close monitoring, pain management, pressure patch, and antimicrobial prophylaxis.

Keywords Corneal abrasion, gastrointestinal endoscopy, moderate sedation

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Introduction

Corneal abrasion has been reported as the most common ocular complication of non-ocular surgery under general anesthesia and deep sedation [1-3]. Symptoms of corneal injury include ocular burning, scratchy sensation, redness, and pain. Pain associated with the cornea can be intense, as it contains a high density of sensory nerve endings [1,4]. Diagnosis is made by ophthalmological examination and treatment includes pain management, antimicrobial prophylaxis, pressure patch and close monitoring. Perioperative corneal abrasions under general anesthesia may be attributed to direct chemical or mechanical trauma to the cornea, or to exposure and drying due to lagophthalmos (incomplete eyelid closure) [3-5]. Additional risk factors include lateral or prone positioning, advanced patient age, longer procedure times (especially those > 1 h), supplemental oxygen *en route* to or in the post-anesthesia care unit, and trauma due to direct contact with the cornea [1-3,5,6]. A single case of this complication associated with

endoscopy was reported 24 years ago, in a 75-year-old male undergoing advanced endoscopy (endoscopic retrograde cholangiopancreatogram) in the prone position under moderate sedation. In recovery the patient complained of blurred vision and ophthalmological consultation diagnosed a left corneal abrasion [7]. We now report a case series of 4 patients who developed corneal injuries while undergoing standard upper and lower gastrointestinal (GI) endoscopy under moderate sedation.

Case series

Patient 1

A 45-year-old male underwent a diagnostic esophagogastroduodenoscopy (EGD) for variceal surveillance. The patient had type 2 diabetes, an American Society of Anesthesiologists (ASA) score of 4, and no history of ocular disease nor symptoms of corneal injury prior to the procedure. The patient received nurse-administered propofol sedation with 50 µg fentanyl and 360 mg propofol, and received supplemental oxygen via bilevel positive airway pressure (BiPAP) by nasal mask monitored by respiratory therapy. The procedure time was 15 min and no other interventions were performed or complications noted. Upon waking from sedation, the patient complained of redness and swelling of his left eye. The slit-lamp examination revealed a corneal abrasion (Figs. 1 and 2). The patient was treated with an erythromycin ointment and healed without further complication.

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Conflict of Interest: None

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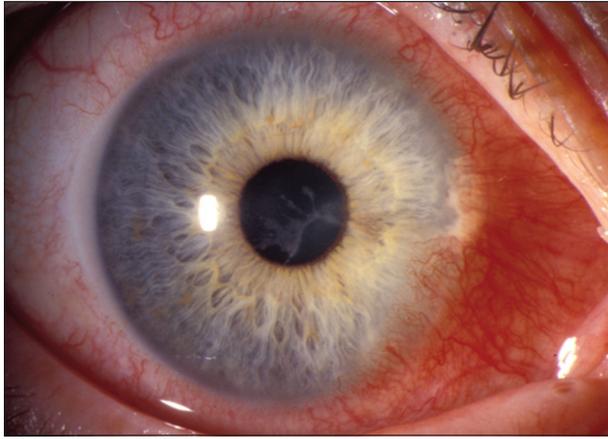


Figure 1 Photograph of a corneal abrasion showing injury to the ocular epithelium. (Photo credit to Susan Chortkoff, MD)



Figure 2 Same patient as Fig. 1, after fluorescein staining. (Photo credit to Susan Chortkoff, MD)

Patient 2

A 67-year-old male with a history of polyps underwent a colonoscopy for colon cancer surveillance. The patient had no history of diabetes, an ASA score of 2, and no history of ocular disease nor symptoms of corneal injury prior to the procedure. The patient received nurse-administered propofol sedation with 25 µg fentanyl and 250 mg propofol, and received supplemental oxygen at 12 L/min via a non-rebreather mask. The procedure time was 21 min and the patient required a chin-lift maneuver because of desaturation. Upon waking from sedation, the patient complained of pain, scratchy sensations and redness in the right eye. The slit-lamp examination revealed a corneal abrasion. The patient was treated with proparacaine and a pressure patch and healed without any further complication.

Patient 3

A 69-year-old male underwent combined EGD and colonoscopy performed in the medical intensive care unit for hematochezia. The patient had type 2 diabetes, an ASA score of 4, and no history of ocular disease nor symptoms of corneal

injury prior to the procedure. The patient was sedated with 1 mg midazolam and propofol under monitored anesthesia care; supplemental oxygen was administered via nasal cannula at 4 L/min. The procedure time was 2 h and 18 min and no other interventions were performed or complications noted. Upon waking from sedation, the patient complained of discomfort in his right eye with no visual difficulties. On inspection the right eye presented conjunctival injection. Wood's lamp examination revealed a corneal abrasion. The patient was treated with a topical anesthetic ointment. At a follow-up appointment the next day, the patient reported that the eye redness had resolved and that the pain was much improved.

Patient 4

A 76-year-old male underwent EGD for surveillance after previous complete response of ablation for Barrett's esophagus with high-grade dysplasia. The patient had no history of diabetes, an ASA score of 2, and no history of ocular disease nor symptoms of corneal injury prior to the procedure. The patient received nurse-administered propofol sedation with 25 µg fentanyl and 360 mg propofol. Supplemental oxygen was administered via nasal cannula at 6 L/min. The procedure time was 30 min and no other interventions were performed or complications noted. Upon waking from sedation, the patient complained of eye discomfort. The slit-lamp examination revealed a corneal abrasion. The patient was treated with an erythromycin ointment and healed without complication.

Discussion

Standard GI endoscopy, including EGD and colonoscopy, with moderate sedation is extremely safe, with very low major and minor post-procedural complication rates [8-10]. Corneal injury/abrasion is a known but rare complication of general anesthesia and deep sedation but has been reported only once previously with GI endoscopy, during an endoscopic retrograde cholangiopancreatography with the patient in a prone position. We identified 4 cases over the past 5 years (May 2013 to April 2018). All procedures were performed under moderate sedation: 3 of the 4 patients received non-anesthesiologist administered propofol sedation, which is our institution's standard method of providing sedation for GI endoscopy, and 1 received monitored anesthesia care with propofol. None of the patients had a previous history of ocular disease nor any symptoms of corneal injury prior to endoscopy. We suspected that the injuries in these cases were due either to direct trauma or to exposure and drying from high flow oxygen in patients with incomplete eyelid closure. Supplemental oxygen was administered via a variety of methods, including nasal cannula, non-rebreather mask and nasal BiPAP mask. The potential causes of direct trauma were an improperly fitted BiPAP or non-rebreather mask, or the patient's head being positioned with the left eye turned into the pillow. Other potential risk factors were that all cases were performed with the patients lying in the left

lateral position (for left eye injury) and the prolonged procedure time in 1 of the 4 procedures (2 h 18 min).

After the initial case of corneal abrasion, our endoscopy lab provided training to recovery staff to make them aware of potential corneal complications associated with endoscopy in patients complaining of eye dryness, pain or redness after the procedure. We also adopted the following recommendations to decrease the risks of corneal abrasion: making sure patient's eyelids are closed fully during the procedure; taking extra care when fitting and placing supplemental oxygen delivery devices (nasal cannulas, non-rebreather and positive airway pressure masks); ensuring that oxygen does not blow onto the eyes; and ensuring that the patient's eyes do not make direct contact with the procedure bed, pillow or other surfaces. Standard recommendations for prevention of corneal abrasion during GI endoscopy, including application of ointments or taping the eyelids closed, were felt to be too intrusive for patients undergoing relatively short-duration endoscopic procedures.

In conclusion, corneal abrasion is a painful and potentially serious complication of moderate sedation during GI endoscopy. We suspect this complication is an under-recognized and underreported complication of GI endoscopy. It is important for endoscopists and staff to be aware of its possible occurrence, so that effective prevention, diagnosis and management of this potentially serious complication may be achieved.

References

1. Malafa MM, Coleman JE, Bowman RW, Rohrich RJ. Perioperative corneal abrasion: updated guidelines for prevention and management. *Plast Reconstr Surg* 2016;**137**:790e-798e.
2. Segal KL, Fleischut PM, Kim C, et al. Evaluation and treatment of perioperative corneal abrasions. *J Ophthalmol* 2014;**2014**:901901.
3. White E, Crosse MM. The aetiology and prevention of perioperative corneal abrasions. *Anaesthesia* 1998;**53**:157-161.
4. Moos DD, Lind DM. Detection and treatment of perioperative corneal abrasions. *J Perianesth Nurs* 2006;**21**:332-338; quiz 339-41.
5. Gild WM, Posner KL, Caplan RA, Cheney FW. Eye injuries associated with anesthesia. A closed claims analysis. *Anesthesiology* 1992;**76**:204-208.
6. Carniciu A, Fazzari M, Tabibian P, et al. Corneal abrasion following anesthesia for non-ocular surgical procedures. A case-control study. *J Perioper Pract* 2017;**27**:247-253.
7. Green JA, Goldman JH, Bernstein D, Barkin JS. Corneal abrasion occurring during ERCP. *Gastrointest Endosc* 1994;**40**:261.
8. Ben-Menachem T, Decker GA, Early DS, et al; ASGE Standards of Practice Committee. Adverse events of upper GI endoscopy. *Gastrointest Endosc* 2012;**76**:707-718.
9. Fisher DA, Maple JT, Ben-Menachem T, et al; ASGE Standards of Practice Committee. Complications of colonoscopy. *Gastrointest Endosc* 2011;**74**:745-752.
10. Martin DP, Weingarten TN, Gunn PW, et al. Performance improvement system and postoperative corneal injuries: incidence and risk factors. *Anesthesiology* 2009;**111**:320-326.