

## Green urine: A cause for concern?

Sir,

Any deviation in normal urine color intraoperatively is alarming to the clinician. Frequently observed discoloration of urine is high-colored urine (dehydration), dark yellow to orange (bilirubinuria), pink to red-brown (hematuria), brown (myoglobinuria), yellow (Vitamin B-complex), or orange

(rifampicin). We report a case of green urine in a 45-year-old female patient, 65 kg, American Society of Anesthesiologists Physical Status I, scheduled for laparotomy for repair of an enterocutaneous fistula. Anesthesia was induced with morphine 6 mg and propofol 100 mg, and tracheal intubation was facilitated by vecuronium 6 mg. Anesthesia was maintained with isoflurane 0.6% and nitrous oxide in oxygen (33%). The fistulous tract was delineated by the surgeon using 8 ml of methylene blue 1%. Two hours after methylene blue use, a change in urine color was observed



**Figure 1:** Methylene blue-induced green urine

from normal yellow to green [Figure 1]. The intraoperative period was uneventful. Surgery lasted for 5 h. At the end of surgery, residual neuromuscular block was reversed (neostigmine, glycopyrrolate). The postoperative period was unremarkable. Patient's urine color became normal 8 h postoperatively.

Methylene blue, a nonpathogenic water-soluble dye, is used intraoperatively for diagnostic tests (fistula detection, patency of fallopian tubes, and identification of parathyroid glands). Methylene blue-induced green urine has been reported previously. Green urine was seen in a patient of bladder carcinoma who was on ProSed™ DS (an oral analgesic, antiseptic, and antispasmodic medication that contains methylene blue).<sup>[1]</sup> Methylene blue is metabolized in the body to leucomethylene blue which is excreted primarily in the urine. Some are excreted unchanged in the urine. Blue urine is rare because the blue pigments combine with urochrome (yellow pigment in urine) resulting in green urine.<sup>[2]</sup> Methylene blue absorbs light at wavelength 550-700 nm with preferential maximum absorbance at 660 nm and 609 nm (shoulder peak) and can be detected in urine by spectrophotometry. The presence of these two peaks in a green urine sample confirms the presence of methylene blue. In a patient with normal renal function, methylene blue appears in urine in a few minutes after intravenous administration and 2-6 h after oral administration.<sup>[3]</sup> It may remain detectable after 24 h.<sup>[3]</sup> In our case, green urine appeared 2 h after use of methylene blue and lasted for ≈ 10 h. Urine analysis was normal.

Other medications are associated with green urine. Drugs such as promethazine, thymol, cimetidine, and propofol contain phenol groups that are conjugated in the liver

and subsequently excreted by the kidneys as green urine.<sup>[2]</sup> Nonphenol medications that produce green urine are metoclopramide, amitriptyline, and indomethacin. Water-soluble artificial dyes can cause green urine.<sup>[2]</sup> Not all causes of green urine are innocuous. In patients with chronic obstructive jaundice, the presence of biliverdin (oxidation product of bilirubin) in urine can give a green hue.<sup>[2]</sup> Urinary tract infections caused by *Pseudomonas* can turn urine green due to pyocyanin and pyoverdin pigments produced by the bacterium.<sup>[4]</sup> Extreme discoloration may interfere with the interpretation of yellow colorimetric chemical reagent strip tests for glucose and protein by masking or falsely enhancing positive color changes.<sup>[1]</sup>

Propofol infusion has been implicated in causing green urine.<sup>[5]</sup> The green color is due to the excretion of quinol derivatives resulting from renal sulfo- and glucuro-conjugation of propofol.

Green urine is an unusual intraoperative occurrence. Though intriguing, it is of little significance and requires no treatment unless it is secondary to infectious pathology. Patient's history and clinician awareness can lead to prompt recognition and limit unnecessary investigations. Chronic accumulation of such products as part of indigenous medicines can lead to potential toxicity in patients with compromised renal failure.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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Access this article online	
Quick Response Code:	Website: www.joacp.org
	DOI: 10.4103/0970-9185.202190

**How to cite this article:** Prakash S, Saini S, Mullick P, Pawar M. Green urine: A cause for concern? J Anaesthesiol Clin Pharmacol 2017;33:128-30.  
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