

Henna dye: A cause of erroneous pulse oximetry readings

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ABSTRACT

Pulse oximetry is a noninvasive and continuous monitoring of the pulsed saturation of hemoglobin oxygen. Because of its simplicity and usefulness, it is part of monitoring recommended for any anesthesia in the operating room. Different factors may limit the use of this monitoring. We report a case of difficulty monitoring by the presence of henna in a patient scheduled for general anesthesia in prone position.

Key words: Anesthesia, henna dye, pulse oximetry, surgery

INTRODUCTION

Pulse oximetry is a noninvasive, continuous monitoring of the saturation of oxygen when bound to hemoglobin in the blood. Although its usefulness cannot be doubted, the technique has a number of limitations, which may lead to inaccurate readings.^[1] The following case report focuses on one such factor which can alter the accuracy of the pulse oximeter.

CASE REPORT

A 65-year-old female presented in hospital for a herniated disc surgery. A preoperative clinical exam showed a darkened skin coloration of the hands and toes.

A week prior to admission, she had applied henna on her hands and feet. On the day of the surgery, she was shifted to the operating room for the procedure under general anesthesia. Preinduction monitors using pulse oximeter

failed to produce a waveform on reading from any of the fingers or toes. Equipment failure was excluded by trying the probe on members of the staff. A change of oximeter also failed to produce a signal. The alternative of using others sites like the earlobe for monitoring was not viable because of the prone position required the surgery. The procedure was then delayed to a later date. Repeated attempts to clean fingers with a diluted bleach solvent did help in mitigating the dark coloration of the skin of the fingers [Figure 1]. The patient could be monitored successfully by applying the probe to the fingers four days later.

DISCUSSION

A pulse oximeter functions by evaluating the transmission of light at two wavelengths. Any interference in the transmission of light is likely to affect the oxygen saturation readings. One of the factors which may interfere with pulse oximeter readings is the dark skin pigmentation caused by certain skin dyes.^[2,3]

Henna (*Lawsonia inermis*) is a member of the family Lythraceae, and is a commonly used dye. Henna, when newly applied, causes a black discolouration of the skin. During this initial phase, it absorbs all wavelengths of visible light, allowing only infrared rays to pass through. This results in the failure to monitor oxygen saturation using pulse oximeters.^[3] Unlike other colorants, henna

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Figure 1: skin fingers pigmentation after several attempts using solvent

penetrates the superficial layers of the skin and cannot be removed immediately by common solvents.^[4] In our case, the patient's use of solvent has helped to mitigate the black color of the skin to some extent, giving it a reddish color.

Some researchers have investigated the effect of henna on the accuracy of pulse oximetry. They found that black henna caused errors in oxygen saturation readings while red henna did not.^[5] Another study showing that the style of the henna stain can affect the readings of the pulse oximeter. Patients who had henna paste applied to the thumbnails only showed an insignificant effect on oximetry

but those in whom the entire digit was stained were at significantly higher risk for inaccurate readings when red henna was used. Our case report illustrates the difficulty of using pulse oximetry in patients who have used henna, especially in context of our culture where it is used often. It can affect the accuracy of pulse oximetry readings. We suggest advising patients scheduled for programmed surgery, not to apply henna on their hands, two weeks prior to scheduled interventions.

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