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INSTRUCTIVE CASE

Green breast milk: A rare side effect of propofol

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Breast milk is the only nutrition source that contains all the nutrients an infant needs, supports the infant both physically and emotionally, plays an important role in the communication between the infant and its mother and protects the infant against illnesses in the future.[1] Normally, breast milk is white-yellow in colour. Colour change in breast milk is a rarely seen clinical phenomenon. Abnormal colour change in breast milk may indicate an underlying pathological or benign condition. Such changes in the colour of breast milk may happen as side effects of medication, although rarely. If this side effect is unknown to health staff, it may lead to panic and irrelevant testing. This can be prevented by taking a detailed patient history regarding the medications they have been prescribed.

Here, we present a case of green breast milk that occurred due to intravenous propofol use.

Case Report

A 40-year-old woman, gravide 5, parity 4 and cesarean history, presented to the emergency service at the $23^{4/7}$ week of gestation with sudden vaginal bleeding and preterm labour. Upon diagnosis of a cord prolapse, delivery was conducted with emergency caesarean section under general anaesthesia after laboratory tests were obtained. A male infant was born with a birthweight of 615 g and an Apgar score 4 at 1th minute and 6 at 5th minute. The infant had insufficient spontaneous respiration, was diagnosed as respiratory distress syndrome and was intubated in the neonatal intensive care unit, followed by administration of surfactant.

The woman did not have a history of previous disease, smoking or alcohol use. She only had a history of using a folic acid preparation in the first 3 months of pregnancy. All laboratory test results were normal, including haematological and biochemical tests and blood and urine cultures. The patient was given cefazoline, propofol, remifentanil, fentanyl, rocuronium, metoclopramide and sevoflurane during the caesarean operation. The woman received the propofol (intravenous) in two induction boluses: the first dose was 150 mg, followed shortly by the second at 50 mg dose. The caesarean operation was completed without any complications.

The first breast milk was expressed from the mother 12 h after the operation. The breast milk was green in colour (Fig. 1a). It was initially thought to be an infection, so a sample from the milk was sent to be cultured for microbiological analysis. The woman was administered only cefazoline and acetaminophen after the operation. Urine colour was not monitored. The woman continued to milk herself; however, the infant was not given the breast milk. No pathogens were identified in the culture. The woman was discharged from the hospital without post-operative complications in stable condition on 2 after birth. The colour of the milk at post-operative hour 30 was light green but returned to normal colour (white-yellow) by hour 48. There was no smell in milk and its viscosity was normal (Fig. 1b,c). A literature review was conducted to determine the causes of green milk. We found that it was associated with intravenous propofol used during the induction of general anaesthesia; no further investigations were conducted. The infant was provided minimal enteral nutrition with breast milk via orogastric catheter after the colour of the milk returned to normal.

Written consent was obtained from parents of patient before submission.

Key Points

1 Breast milk is the only nutrition source that contains all the nutrients an infant needs.
2 Colour change in breast milk is a rarely seen clinical phenomenon.
3 Such changes in the colour of breast milk may happen as side effects of medication.

Discussion

Although not a common phenomenon, colour change in human breast milk can be caused by certain foods, medications and infections.[2] Green milk in neonatal intensive care units is a rare and interesting phenomenon. Yazgan *et al.*[3] reported green milk due to the iron in reddish-brown multivitamin preparations taken daily by a mother after delivery. Up to present, there are two reported cases of green milk due to propofol infusion. In the first case, a 33-year-old woman, who was operated laparoscopically due to ectopic pregnancy, was given 474 mg propofol infusion in general anaesthesia. She was milked 8 h after the operation and the milk was green. The milk colour returned to normal 48 h after the operation.[4] In the other case, a 27-year-old woman with an 8-month-old infant received a 200-mg propofol intravenous bolus for general anaesthesia prior to an appendectomy. Twenty-two hours after the operation her milk turned green but returned to normal colour on post-operative day 4.[5]

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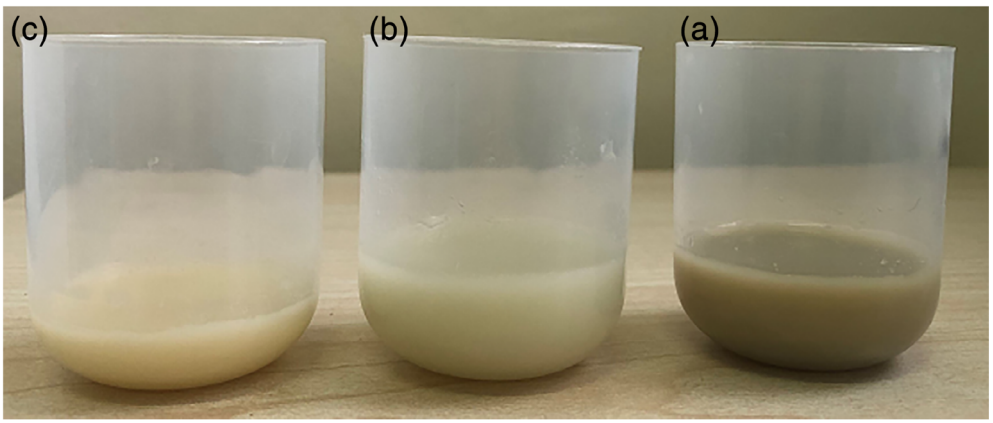

Fig. 1 (a) Green breast milk drawn into a cup for demonstration 12 h after operation. (b) Decolorisation begins within 30 h. (c) The breast milk returned to original colour 48 h after the operation.

Although propofol was not detected in the breast milk of either case, the use of intravenous propofol for the induction of general anaesthesia was associated with the green colour. In our case, too, we think that the green colour was caused by propofol, as the mother did not have a history of previous disease or medication use, all laboratory tests were normal and the milk colour returned to normal within 2 days. In our case, the mother had received 200 mg propofol during operation.

Propofol is a sedative, hypnotic intravenous medication used in the induction and maintenance of general anaesthesia, for the sedation of people who are intubated in intensive care units, and in diagnostic and surgical operations. Propofol is metabolised to form water-soluble, inactive metabolites in the liver and is discharged through kidneys, mostly as 1-glucuronide, 4-glukuronide and 2,6-diisopropyl-1,4 quinol 4-sulfate conjugates.[5] These phenolic metabolites result in green-coloured urine,[5] which has been reported in several cases.[6] Green urine is a benign rather than a nephrotoxic side effect, and the colour returns to normal after medication use is stopped.[6] This colour change in urine occurs when propofol is removed from the hepatic pathway and when extrahepatic elimination occurs.[5] The duration of the colour ranges from 2 h to 2 days after medication use is stopped.[6] Indeed studies have shown that propofol can pass to breast milk. [7] However, several studies have investigated the side effects of propofol on breastfed infants. Stuttmann *et al*.[8] reported the effects in four women who had term births and breastfed their babies. The women were given intravenous propofol (target serum propofol concentration, 6.5 μg/L) for general anaesthesia for general surgical operations. The operations lasted from 35 to 45 min, and each mother breastfed their babies 1.5 h, 2.8 h, 4.6 h or 5 h, respectively, after extubation; none of the babies were observed to have sedation indications. That amount of propofol in milk was thought to have no effect on healthy, term babies[8]; however, there are no definitive reports on the effects of propofol on breastfed preterm babies.

In conclusion, we propose that the green milk in our case may have been caused by a still-unknown chromophoric substance resulting from propofol. This is the third reported case of green milk due to propofol. Health staff and mothers should be aware of this rare occurrence. Although the metabolite which gives the green colour to the milk seems to be inactive, as there is no substantial information, breastfeeding preterm babies should be continued cautiously with close monitoring.

The English in this document has been checked by at least two professional editors, both native speakers of English. For a certificate: http://www.textcheck.com/certificate/9htEts

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