Skin reactions following the application of electrocardiography (ECG) electrodes have been reported in adults and children, and are postulated to result from contact with the conductive gel or adhesive used on the electrodes. Although contact dermatitis is the usual cause of such reactions, contact depigmentation or hypopigmentation may also occur. We report a case of hypopigmentation in a healthy boy following continuous electrocardiography monitoring during general anesthesia for dental rehabilitation.

**Introduction**

Contact dermatitis due to the conductive gel or adhesive found on electrocardiography (ECG) electrodes has been reported in adults and children. Since continuous ECG monitoring is an American Society of Anesthesiologists (ASA) standard for anesthesia care, every child having general anesthesia is at risk for developing a skin reaction to the placement of ECG electrodes. We report a case of hypopigmentation in a child following ECG electrode placement for monitoring during anesthesia.

**Case Report**

After institutional review board (IRB) approval and parental consent, we reviewed the case of a healthy 4-year-old boy with no known drug or food allergies who underwent a dental rehabilitation under general endotracheal anesthesia. Standard monitoring was performed, including the placement of three ECG electrodes (Kendall Medi Trace 530®) over the chest. Continuous ECG monitoring was performed for about 1 ½ hours during the procedure. General anesthesia was provided using sevoflurane and nitrous oxide, and there was supplementation with intravenous fentanyl, propofol, dexamethasone, and ondansetron. The procedure, anesthetic, and recovery were uneventful, and the boy was discharged to home in stable condition with no documentation of cutaneous inflammation or lesions in the post anesthesia care unit (PACU). About one month after the procedure, the mother noticed three hypopigmented circular areas corresponding to the size, shape, and location of the ECG electrodes that had been placed during anesthesia. There was no preceding or concurrent erythema, scaling, or rash reported by the mother. She documented the lesions with photographs.
(Fig. 1) and contacted the anesthesiologist. She was referred to a pediatric dermatologist for evaluation, but the lesions slowly resolved over the subsequent months before the appointment, so the skin exam was normal at that visit. The dermatologist performed no diagnostic studies and prescribed no treatment.

Discussion

Reports regarding skin reactions (erythema, pruritis, hypopigmentation, and hyperpigmentation) to the conductive gel and adhesive in ECG electrodes have been published\(^1\text{-}^5\). One report includes a similar case of hypopigmentation without preceding erythema in a 29-year-old woman, with subsequent spontaneous resolution\(^5\). Contents of conductive gel implicated in these skin reactions have included cross-linked polymers (propylene glycol), acrylates, and p-tert-butylphenol-formaldehyde\(^1\text{-}^3\text{,}^4\). The adhesive surrounding the conductive gel has also been implicated in some reactions. P-tert-butylphenol-formaldehyde may be found in both the adhesive and gel components of the electrode\(^1\). Contact dermatitis may take hours to days for onset after contact and days to weeks for resolution. Although hyper- or hypopigmentation can follow contact dermatitis, this case was unusual because no visible inflammation was reported to precede the hypopigmentation of the skin. In addition, the lesions had a delayed onset of about one month and lasted several months before spontaneous resolution. The patient’s mother was a nurse and frequently bathed the child, making it unlikely she overlooked significant erythema or pruritis.

Other possible diagnoses were considered due to the lack of preceding symptoms. Since there was no antecedent inflammation, we believe contact hypopigmentation rather than post-inflammatory hypopigmentation from an allergic or irritant contact dermatitis was the most likely etiology. Contact hypopigmentation can be due to either induced vitiligo or a direct chemical toxic effect on the melanocytes. The latter is more likely, as the patient has not developed other lesions of vitiligo, the lesions appeared hypopigmented rather than depigmented, and he had not displayed other autoimmune tendencies\(^6\). Pityriasis alba, a mild form of eczema, may also present with self-limited hypopigmented lesions, but these should not appear with sharp, geometrically defined borders that correspond with external contacts, and lesions are usually on the upper outer arms and cheeks in patients with atopic dermatitis\(^7\). Tinea versicolor, a superficial fungal infection, can produce lesions with a similar appearance, but does not present with a few isolated lesions corresponding to prior contact\(^8\).

Anesthesiologists should be aware that skin
reactions may occur in children following placement of ECG electrodes. The usual diagnosis is contact dermatitis that is self-limited with removal of the offending agent. Mild erythema and pruritis can be treated with topical steroids and oral diphenhydramine. Patients with persistent post-inflammatory or contact hypopigmentation should be referred to a dermatologist for evaluation. Other persistent, severe, or unusual reactions may reflect a more serious underlying medical condition, and should also prompt consultation with a dermatologist. Families should inform future medical caregivers of such a reaction so that exposure can be limited during care.

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³ Post-tetanic count
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