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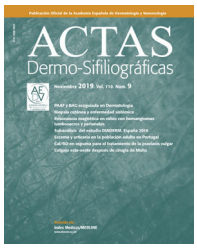

REVIEW

Safety in Dermatologic Procedures: Anaphylaxis, Vasovagal Reaction, and Hyperventilation☆

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Hyperventilation

Abstract This article, part of a the series on safety in dermatologic procedures, covers the diagnosis, prevention, management, and treatment of 3 situations or conditions. The first condition we address is anaphylaxis, an uncommon but severe and potentially fatal reaction that must be recognized quickly so that urgent management coordinated with an anesthesiologist can commence. The second is fainting due to a vasovagal reaction, which is the most common complication in dermatologic surgery. This event, which occurs in 1 out of every 160 procedures, usually follows a benign course and resolves on its own. However, in patients susceptible to vasovagal reactions, syncope may lead to asystole and cardiac arrest. The third is acute hyperventilation syndrome, which is an anomalous anxiety-related increase in breathing rate beyond metabolic requirements. Brief practical recommendations for managing all 3 events are included.

PALABRAS CLAVE
Procedimientos quirúrgicos dermatológicos;
Efectos adversos;
Complicaciones;
Anafilaxia;
Síncope vasovagal;
Hiperventilación

Seguridad en procedimientos dermatológicos: anafilaxia, reacción vasovagal e hiperventilación

Resumen En el presente artículo de la serie ''Seguridad en procedimientos dermatológicos'' se aborda el diagnóstico, prevención, manejo y tratamiento de tres situaciones. Primeramente, se aborda la anafilaxia: una situación infrecuente, grave y potencialmente mortal, que requiere una identificación ágil para un manejo urgente coordinado por parte de médicos especialistas en Anestesiología. En segundo lugar, la reacción vasovagal, que es la complicación médica más frecuente durante la cirugía dermatológica (1 de cada 160 intervenciones), con una evolución

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habitualmente benigna autorresolutiva, pero que en individuos muy sensibles puede provocar una parada cardiaca por asistolia. En tercer y último lugar, el síndrome de hiperventilación aguda, que es una respuesta anómala de determinados individuos a un evento estresante, con un incremento de la ventilación que excede la demanda metabólica. En los tres casos se incluyen recomendaciones que se plasman de forma práctica y somera.

Anaphylaxis

Anaphylaxis is a severe, life-threatening situation, albeit rare. It can be caused by immunoglobulin E (IgE)-dependent or IgE-independent mechanisms. The characteristic clinical signs are presented in Figure 1.[1] Recurrent skin and mucosal manifestations may or may not be observed, and clinical signs may be limited to arrhythmias, acute coronary syndrome, or severe asthma.

Risk factors for poor outcome include chronic respiratory diseases, certain medications (β-blockers, angiotensin-converting enzyme inhibitors, nonsteroidal anti-inflammatory drugs, and benzodiazepines), a personal history of mastocytosis, and delayed adrenaline administration.[1,2]

Avoidance of triggers is essential for prevention. This means that the patient's known allergies must be taken into account (e.g. latex allergies and possible cross-reactivity with foods such as kiwi, avocado, or banana).[1,2]

When considering treatment[2] (Table 1) it is important to bear the following points in mind:

1) The anesthesiology or intensive care services should be alerted as soon as anaphylaxis is suspected.

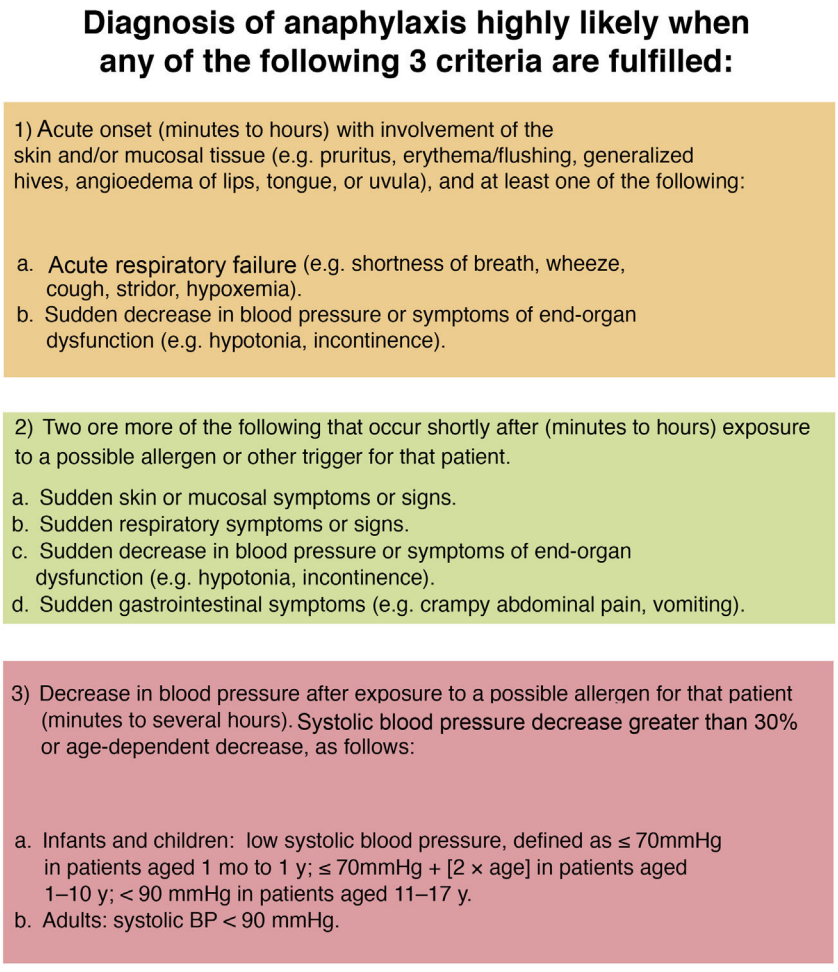

Figure 1 Clinical manifestations of suspected anaphylaxis. Adapted from Shaker et al.[1]

Table 1 Treatment of Anaphylaxis

Immediate notification of the anesthesiology service if anaphylaxis is suspected		
Treatment		Description
ABC (life support)		• *Airway*: ensure airway patency. • *Breathing*: ensure efficient breathing, SpO_2 > 95% (provide oxygen therapy at > 10 L/min). • *Circulation*: ensure minimum perfusion pressure (MAP > 65 mmHg).
First line	Adrenaline (as soon as possible)	• *Intramuscular (better than subcutaneous):* - Adults: 0.5 mg (approximately equivalent to 0.01 mg/kg). - Children: < 6 y, 0.15 mg 6–12 y, 0.3 mg >12 y, 0.5 mg Can be repeated after 5–15 min Intravenous: 50–200 μg in bolus *Caution should be exercised to avoid overdose (arrhythmia, hypertensive crisis, and pulmonary edema), especially in patients with ischemic heart disease.* *Patients receiving chronic beta-blocker treatment have a poorer response.*
	Fluid therapy	In the first 30 min: Adults: 1–2 L Children: 20 mL/kg
Second line	Corticosteroids	At the following doses for at least 3–4 days, with subsequent progressive reduction: Methylprednisolone, 1 mg/kg Hydrocortisone, 200 mg
	Antihistamines	Dexchlorpheniramine, 50 mg
	Bronchodilators	In case of bronchospasm
Referral to allergology (if allergic reaction is suspected)		To facilitate assessment, it is recommended to determine plasma tryptase levels at 15 min, 3 h, and 24 h.

Abbreviations: MAP, mean arterial pressure; SpO_2, oxygen saturation.

2) Adrenaline should be administered early.
3) The causative agent (e.g. antibiotics, blood products, contrast medium, latex) must be removed.
4) The risk of biphasic responses (e.g. symptom recurrence without re-exposure to the causative agent) in the first 24–72 hours, which require hospital admission in severe cases, must be considered.

Vasovagal reaction

This is the most frequent medical complication during dermatological surgery. It has been reported in 1 in every 160 interventions.[3] Although its presentation may be alarming, it usually has a benign, self-resolving course. However, in very sensitive individuals it can cause cardiac arrest due to asystole.[4]

It is caused by a pathological response to various stimuli of the autonomic reflexes that control blood pressure and heart rate. The Bezold-Jarisch reflex is activated, causing an initial loss of sympathetic tone (hypotension) followed by intense vagal discharge (bradycardia). Either of the two components can predominate. The resulting cerebral hypoperfusion can cause a temporary loss of consciousness (syncope).

Although this type of reaction can occur in any individual in certain circumstances, predisposing factors include individual susceptibility (a history of vagal reactions to previous invasive procedures), age less than 35 years, female sex, lack of sleep, fasting, ambient heat, and standing.[4]

In dermatological surgery, triggers include fear, the sight of blood and needles, and pain.

Due to its neurogenic mechanism, onset occurs rapidly (within seconds) and the episode duration can range from seconds to minutes. With patient monitoring, a drop in blood pressure and heart rate can be detected before the patient experiences symptoms, which include feelings of weakness and dizziness, paleness, sweating, and occasionally nausea and vomiting. If the reaction proceeds loss of consciousness may occur, followed by brief tonic–clonic contractions if the cerebral ischemia is very abrupt.

Preventive measures should be applied in young patients and/or those with a history of reactions of this type. Preventive measures and treatment, to be applied after onset, are listed in Table 2.

Hyperventilation

Acute hyperventilation syndrome is an abnormal response in certain individuals to a stressful event, characterized by an

Table 2 Prevention and Treatment of Vasovagal Reaction[4,6–8]

Prevention	
Preoperative	Frugal intake (avoiding fasting) and good hydration (water intake) beforehand, surgical procedure permitting[6,8] Preoperative oral anxiolytics (in case of locoregional anesthesia).[7] Rapid-acting benzodiazepines 1 h before: Short half-life: midazolam (7.5 mg) Long half-life: diazepam (5–10 mg) In highly susceptible individuals: Atropine 0.5 mg (intramuscular or subcutaneous) 30 min to 1 h before surgery
Intraoperative	Avoid excessive ambient heat in the operating theater Always perform painful or invasive techniques with the patient in a supine position Engage in conversation (to distract, without conveying anxiety or concern) Keep needles, blood, etc. out of patient's line of sight When starting the procedure in susceptible individuals or those with initial symptoms: Perform isometric counter-pressure maneuver with force for 30 s (Fig. 2) *These maneuvers, when properly executed, greatly increase venous return and are effective in 40% of individuals* In case of pain: stop the procedure and re-anesthetize
Treatment	
Initial maneuvers[4]	Stop the stimuli that trigger the vagal reaction: Stop surgical procedure Remove light from the patient's face Trendelenburg position and/or elevation of legs (to increase venous return and cerebral perfusion), turning head to one side for safety Promote ventilation and/or administer oxygen via a mask Maneuvers that induce an adrenergic reaction: Passing a cold wet compress over the face Inhalation of classic ammonium salts
Pharmacotherapy	*In cases of loss of consciousness and/or persistent bradycardia < 50 bpm:* IV injection of 0.5–1 mg (0.5–1 ampoule) of atropine sulfate. The onset of atropine activity occurs approximately 2–4 mL after IV injection The dose can be repeated every 3–5 min, up to a maximum of 3 mg (3 ampoules) If the patient does not have a venous line or venous access is not possible, other routes of administration can be used (although the effect is delayed): intramuscular (5–30 min), subcutaneous (15–30 min), and even sublingual (not predictable, but generally fast) *Atropine is an essential drug in the emergency kit. It is very safe and has no absolute contraindication in emergency situations. Caution must be exercised in patients with ischemic heart disease and smooth fiber-mediated obstructive diseases. It causes frequent but mild side effects (blurred vision, dry mouth, palpitations, etc.)* *In patients with persistent hypotension:* Physiological serum: 500 mL in 5–10 min

Abbreviation: IV, intravenous.

increase in ventilation that exceeds metabolic demand. It is more frequent in individuals with anxiety, who, in situations of fear, breathe rapidly and shallowly using the upper part of the thorax. This breathing pattern is often not apparent. This leads to a decrease in the partial pressure of CO_2 in the blood, which is the main regulator of cerebral circulation, giving rise to the cerebral vasoconstriction that underlies the clinical signs.

It is characterized, initially, by a dysphoric presentation, including anxiety, lightheadedness, shortness of breath and

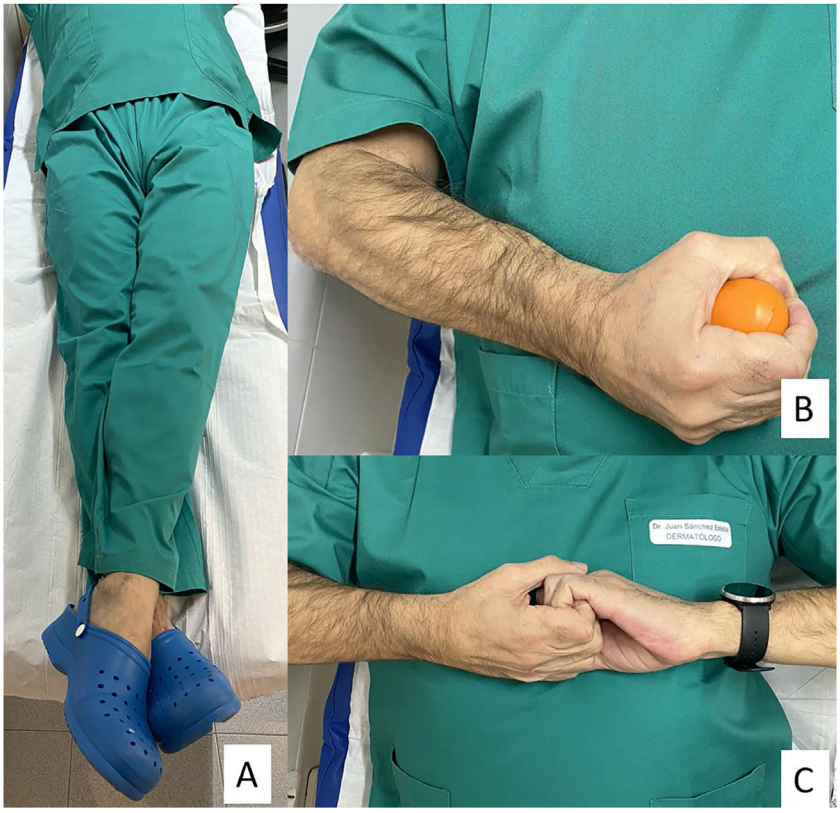

Figure 2 Isometric counter-pressure maneuvers to prevent the progression of vasovagal reaction. A, Cross legs and engage leg muscles. B, Squeeze a rubber ball. C, Pull 2 hands in opposite directions.

upset stomach, nausea, belching, chest tightness, perioral numbness, acral paresthesia, and even tetany of the hands. Blood pressure and heart rate are initially normal, but syncope can occur if the episode progresses.

Up until several years ago breathing into a paper bag was recommended in cases of hyperventilation with no organic cause. However, this technique is no longer considered effective. Current treatment consists of guiding the patient's breathing, applying pressure with one hand on the upper chest, and encouraging the patient to breathe more slowly using the diaphragm (abdominal breathing).[5]

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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