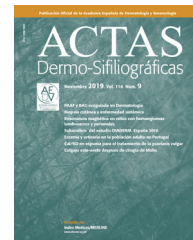




ACTAS Dermo-Sifiliográficas

Full English text available at
www.actasdermo.org



REVIEW

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



B. Lobo-Valbuena,^a A. Martin-Gorgojo,^{b,*} I. Zafra-Cobo,^c J. Sánchez-Estella^{c,†}

^a Servicio de Medicina Intensiva, Hospital Universitario del Henares, Coslada, Madrid, Spain

^b Servicio ITS/Dermatología, Sección Especialidades Médicas, Organismo Autónomo Madrid Salud – Ayuntamiento de Madrid, Madrid, Spain

^c Servicio de Dermatología, Complejo Asistencial de Zamora, Zamora, Spain

Received 21 January 2021; accepted 27 February 2021

Available online 18 June 2021

KEYWORDS

Dermatologic surgery;
Adverse events;
Complications;
Anaphylaxis;
Vasovagal syncope;
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.

© 2021 Published by Elsevier España, S.L.U. on behalf of AEDV. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

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

[☆] Please cite this article as: Lobo-Valbuena B, Martin-Gorgojo A, Zafra-Cobo I, Sánchez-Estella J. Seguridad en procedimientos dermatológicos: anafilaxia, reacción vasovagal e hiperventilación. ACTAS Dermo-Sifiliogr. 2021;112:735–739.

* Corresponding author.

E-mail address: alejandromartingorgojo@aedv.es (A. Martin-Gorgojo).

† In memoriam.

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.

© 2021 Publicado por Elsevier España, S.L.U. en nombre de AEDV. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

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 treatment² ([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.

Diagnosis of anaphylaxis highly likely when any of the following 3 criteria are fulfilled:

1) Acute onset (minutes to hours) with involvement of the skin and/or mucosal tissue (e.g. pruritus, erythema/flushing, generalized hives, angioedema of lips, tongue, or uvula), and at least one of the following:

- a. Acute respiratory failure (e.g. shortness of breath, wheeze, cough, stridor, hypoxemia).
- b. Sudden decrease in blood pressure or symptoms of end-organ dysfunction (e.g. hypotonia, incontinence).

2) Two or more of the following that occur shortly after (minutes to hours) exposure to a possible allergen or other trigger for that patient.

- a. Sudden skin or mucosal symptoms or signs.
- b. Sudden respiratory symptoms or signs.
- c. Sudden decrease in blood pressure or symptoms of end-organ dysfunction (e.g. hypotonia, incontinence).
- d. Sudden gastrointestinal symptoms (e.g. crampy abdominal pain, vomiting).

3) Decrease in blood pressure after exposure to a possible allergen for that patient (minutes to several hours). Systolic blood pressure decrease greater than 30% or age-dependent decrease, as follows:

- a. Infants and children: low systolic blood pressure, defined as ≤ 70 mmHg in patients aged 1 mo to 1 y; ≤ 70 mmHg + $[2 \times \text{age}]$ in patients aged 1–10 y; < 90 mmHg in patients aged 11–17 y.
- b. Adults: systolic BP < 90 mmHg.

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 ABC (life support)	Description
First line	<ul style="list-style-type: none"> • Airway: ensure airway patency. • Breathing: ensure efficient breathing, SpO₂ > 95% (provide oxygen therapy at > 10 L/min). • Circulation: ensure minimum perfusion pressure (MAP > 65 mmHg). • Intramuscular (better than subcutaneous): <ul style="list-style-type: none"> - Adults: 0.5 mg (approximately equivalent to 0.01 mg/kg). - Children: <ul style="list-style-type: none"> < 6 y, 0.15 mg 6–12 y, 0.3 mg >12 y, 0.5 mg <p>Can be repeated after 5–15 min Intravenous: 50–200 µg in bolus</p> <p><i>Caution should be exercised to avoid overdose (arrhythmia, hypertensive crisis, and pulmonary edema), especially in patients with ischemic heart disease.</i></p> <p><i>Patients receiving chronic beta-blocker treatment have a poorer response.</i></p>
Second line	<p>Fluid therapy Corticosteroids</p> <p>Antihistamines Bronchodilators</p> <p>In the first 30 min: Adults: 1–2 L Children: 20 mL/kg</p> <p>At the following doses for at least 3–4 days, with subsequent progressive reduction:</p> <p>Methylprednisolone, 1 mg/kg Hydrocortisone, 200 mg Dexchlorpheniramine, 50 mg</p> <p>In case of bronchospasm</p>
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; SpO₂, 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	
<i>Preoperative</i>	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
<i>Intraoperative</i>	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) <i>These maneuvers, when properly executed, greatly increase venous return and are effective in 40% of individuals</i> In case of pain: stop the procedure and re-anesthetize
Treatment	
<i>Initial maneuvers⁴</i>	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
<i>Pharmacotherapy</i>	<i>In cases of loss of consciousness and/or persistent bradycardia < 50 bpm:</i> IV injection of 0.5–1 mg (0.5–1 ampoule) of atropine sulfate. The onset of atropine activity occurs approximately 2–4 min 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) <i>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.)</i> <i>In patients with persistent hypotension:</i> 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 CO₂ 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

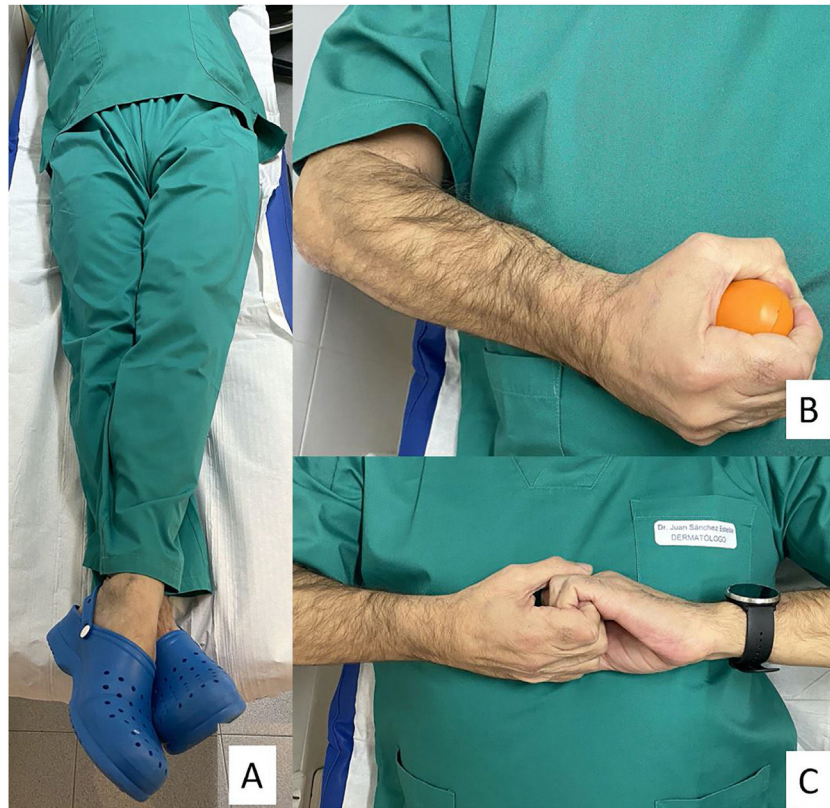


Figure 2 Isometric counter-pressure maneuvers to prevent the progression of vasovagal reaction. A, Cross legs and engage leg muscles. B, Squeeze a rubber ball. C, Pull 2 hands in opposite directions.

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.

Acknowledgments

The authors thank all speakers and participants in the series of conferences on safety in dermatological procedures, as well as all members of the Dermachat dermatological forum.

Several weeks after submitting this article Dr. Sánchez-Estella died of COVID-19. He will be remembered with the deepest gratitude and admiration.

References

1. Shaker MS, Wallace DV, Golden DBK, Oppenheimer J, Bernstein JA, Campbell RL, et al. Anaphylaxis-a 2020 practice parameter update, systematic review, and Grading of Recommendations, Assessment, Development and Evaluation (GRADE) analysis. *J Allergy Clin Immunol.* 2020;145:1082–123.
2. Australasian Society of Clinical Immunology and Allergy. ASCIA Guidelines - Acute management of anaphylaxis. <https://www.allergy.org.au/hp/papers/acute-management-of-anaphylaxis-guidelines>.
3. Minkis K, Whittington A, Alam M. Dermatologic surgery emergencies: Complications caused by occlusion and blood pressure. *J Am Acad Dermatol.* 2016;75:243–62.
4. Wu WJ, Goldberg LH, Rubenzik MK, Zelickson BR. Review of the Evaluation and Treatment of Vasovagal Reactions in Outpatient Procedures. *Dermatol Surg.* 2018;44:1483–8.
5. Oppenheimer JJ, Kern B. Hyperventilation Syndrome. *Medscape.* 2016 <https://emedicine.medscape.com/article/807277-overview>
6. Romano S, Branz L, Fondrieschi L, Minuz P. Does A Therapy for Reflex Vasovagal Syncope Really Exist? *High Blood Press Cardiovasc Prev.* 2019;26:273–81.
7. Kennedy DJ, Schneider B, Smuck M, Plastaras CT. The use of moderate sedation for the secondary prevention of adverse vasovagal reactions. *Pain Med.* 2015;16:673–9.
8. Thijsen A, Masser B. Vasovagal reactions in blood donors: risks, prevention and management. *Transfus Med.* 2019;29:13–22.