ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan240

Spontaneous Orbital Subcutaneous Emphysema Case Report

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Publication Date: 2026/01/17

Abstract: Spontaneous orbital emphysema is defined as the presence of air within the orbital tissues in the absence of direct trauma, typically associated with a sudden increase in intranasal pressure during maneuvers such as nose blowing, sneezing, or performing a Valsalva maneuver. This abrupt rise in pressure may cause microfractures or open preexisting anatomical dehiscences in the lamina papyracea or the medial orbital wall, allowing air to pass into the extraconal spaces. Although its presentation is often sudden and alarming—characterized by periorbital edema, subcutaneous crepitus, and marked aesthetic changes—it is usually a benign and self-limited condition when recognized in a timely manner. We present the case of a 43-year-old woman who consulted for sudden edema and crepitus of the right eyelid immediately after blowing her nose. The initial examination revealed significant bilateral eyelid edema limiting ocular opening, accompanied by crepitus without severe pain, no signs of infection, and no visual impairment. Given the initial suspicion of periorbital cellulitis, the patient was managed under observation until diagnostic imaging was obtained Computed tomography of the paranasal sinuses confirmed the presence of extraconal orbital emphysema without major fractures or signs of infection, a finding that allowed avoidance of unnecessary antibiotic use and invasive procedures. The literature supports this pathophysiological mechanism, highlighting increased intranasal pressure as a frequent trigger of spontaneous orbital emphysema. Experience with this type of case and its early recognition make it possible to differentiate it from infectious processes, optimize conservative management, and reduce unnecessary interventions, thereby contributing to the strengthening of clinical knowledge in emergency care settings.

Keywords: *Spontaneous Orbital Emphysema; Valsalva Maneuver; Acute Periorbital Edema; Lamina Papyracea Microfracture; Computed Tomography; Conservative Management.*

How to Cite: Juliana Bravo Bonilla; Miguel Angel Diaz Diaz; Valentina Salazar Maldonado; Maria Paula Riaño; Nicolás Alejandro Contreras Diaz (2026) Spontaneous Orbital Subcutaneous Emphysema Case Report. *International Journal of Innovative Science and Research Technology*, 11(1), 866-870. https://doi.org/10.38124/ijisrt/26jan240

I. INTRODUCTION

Spontaneous orbital emphysema is an uncommon clinical entity characterized by the presence of air within the periorbital tissues in the absence of direct trauma, surgical procedures, or active infection. Classically, it is associated with sudden increases in intranasal pressure, such as those generated during Valsalva maneuvers, forceful sneezing, or vigorous nose blowing, which allow air to enter the orbit through preexisting bony defects or microfractures of the lamina papyracea. (1)

From a pathophysiological perspective, a sudden increase in intranasal pressure can force air from the paranasal sinuses into the orbital space through minimal disruptions of the medial orbital wall, which are often not clinically evident. These alterations allow air to migrate into the extraconal and intraconal compartments, with possible extension to deep facial planes, producing a clinical presentation that may mimic more serious conditions such as orbital cellulitis, abscesses, or cavernous sinus thrombosis. (2)

Although spontaneous orbital emphysema is usually a benign and self-limited condition, its clinical presentation—characterized by sudden periorbital edema, eyelid ecchymosis, and facial deformity—can generate significant clinical concern and lead to diagnostic errors. Several reports have documented that these patients are initially managed as having orbital infections, receiving broad-spectrum antibiotics or undergoing unnecessary surgical evaluations before the diagnosis is confirmed through imaging studies. (1)

Computed tomography (CT) is the diagnostic modality of choice, as it allows precise identification of air within the orbital and facial soft tissues, delineation of its extent, and, crucially, exclusion of evident bony fractures, sinusitis, or active infectious processes. Accurate interpretation of radiological findings is essential to guide management, avoid

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan240

invasive interventions, and establish a favorable prognosis. (3)

Although spontaneous orbital emphysema has been described in the literature, most of the available evidence derives from isolated case reports and small case series, which limits understanding of its true incidence and clinical variability. The association with Valsalva maneuvers in the absence of trauma remains underrecognized in clinical practice, particularly in emergency departments, where the initial presentation may be mistaken for more severe infectious conditions. (2)

The present report describes the case of a previously healthy 43-year-old female patient who developed sudden periorbital edema secondary to spontaneous orbital emphysema after nose blowing, with extension to deep facial tissues, and no evidence of infection or trauma. This case highlights the importance of considering this entity in the differential diagnosis of acute periorbital edema, as well as the value of clinical reasoning supported by imaging to avoid unnecessary treatments and optimize conservative management.

II. CASE REPORT

A 43-year-old female patient with no known relevant past medical history presented with a 1-day history of sudden-onset edema and swelling of the right periorbital region, associated with limited ocular opening and ecchymosis of the right upper eyelid. The symptoms developed immediately after performing a Valsalva maneuver while blowing her nose, followed by involvement of the ipsilateral zygomatic region, accompanied by mild pain on biting, which prompted her to seek medical evaluation

On admission, the patient was hemodynamically stable, afebrile, and in good general condition, with adequate oral intake and normal oxygen saturation on room air.

On physical examination, right-sided bipalpebral periorbital edema with ecchymosis of the upper eyelid and a sensation of subcutaneous emphysema was noted, without limitation of ocular movements or subconjunctival injection. Mild edema of the right zygomatic region was also observed. The remainder of the general and neurological examination revealed no relevant pathological findings. Laboratory tests were obtained, and the results are shown in the table 2

Considering the sudden onset of symptoms following a Valsalva maneuver, in the absence of trauma, fever, or recent dental procedures, a contrast-enhanced computed tomography (CT) scan of the paranasal sinuses was requested for etiological evaluation

Computed tomography of the paranasal sinuses demonstrated disruption of the medial wall of the right orbit with communication to the nasal cavity, associated with extensive orbital and facial emphysema involving the periorbital soft tissues and deep facial spaces, without bony fractures or signs of sinusitis or active infectious processes. As shown in Figure 1, indicated by the red and yellow arrows, respectively.

Based on the clinical and imaging findings, a maxillofacial surgery consultation was obtained. After detailed review of the computed tomography scan, the team ruled out active infectious processes and traumatic pathology, and considered the emphysema to be secondary to a sudden increase in intranasal pressure following a Valsalva maneuver, with no indication for surgical management or hospitalization.

Conservative management was chosen, consisting of analgesia, symptomatic measures, and outpatient follow-up.

III. DISCUSSION

The presented case illustrates the diagnostic complexity of sudden periorbital edema following maneuvers that cause an abrupt increase in intranasal pressure, a phenomenon described in multiple reports of spontaneous orbital emphysema.

In the case reported by Tatli et al. (2015), a forceful episode of nose blowing was documented as a trigger for air entry into the periorbital tissues, mimicking more serious pathologies. (3) This initial feature is consistent with what was observed in our patient and establishes a pathophysiological framework that has been reiterated by other authors reporting similar mechanisms of spontaneous nasal barotrauma. (2)

In the present patient, the immediate onset of right-sided periorbital edema, eyelid ecchymosis, and involvement of the zygomatic region after vigorous nose blowing closely reflects the patterns described by Çetinkaya et al. (2021), who demonstrated by computed tomography that a sudden increase in pressure can produce microfractures of the lamina papyracea even in the absence of evident trauma. (5) This finding is consistent with the report by Saad et al. (2019), who identified small orbital fractures allowing air to pass into the extraconal space, (6) as well as with the observations of Moon et al. (2017), where thin fractures of the medial orbital wall facilitated air migration during Valsalva maneuvers. (2)

The clinical similarity of the present case to that described by Tatli et al. (2015) is particularly notable: both patients presented with abrupt unilateral edema, without severe pain, without fever, and with a clear temporal association with increased intranasal pressure. (3) Likewise, Sebastián Muñoz et al. (2020) reported a case in which orbital emphysema extended into the malar region, a pattern that mirrors the progression observed in our patient. (7)

From a broader perspective, the systematic review by Salar et al. (2019), which compiled 43 cases of spontaneous orbital emphysema, confirms that nose blowing is one of the most frequent triggering mechanisms. (1) The authors also emphasize that several cases were initially diagnosed as preseptal or orbital cellulitis, highlighting the clinical overlap between mechanical and infectious processes. This diagnostic

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan240

possibility is also underscored by Ingrid et al. (2018), who documented an initial misdiagnosis of cellulitis in a case of spontaneous emphysema, (8) and by Chandana et al. (2016), who reported several patients initially managed as orbital infections among their five cases. (2)

Similarly, Hung Yen et al. (2020) described a case of sudden orbital edema after sneezing, which was initially interpreted as an infectious process until computed tomography revealed the presence of air. (9)

Casarramona et al. (2014) also reported an atypical case in the absence of trauma, in which the clinical presentation mimicked infection before orbital emphysema was confirmed by imaging. (10)

In a complementary case, Cossrow et al. (1977) demonstrated how certain hypodense orbital areas may mimic inflammatory processes, underscoring the importance of precise imaging correlation in these cases. (11)

Other authors, such as Koçak et al. (2009), Dobler et al. (1993), and Akihiro et al. (2013), have emphasized that the initial appearance of periorbital edema may lead to misdiagnoses of cellulitis, abscess, or even cavernous sinus thrombosis, underscoring the importance of the triggering mechanism and the clinical context. (12)

Taken together, the available evidence places Nidia's case within the spectrum of post-Valsalva spontaneous orbital emphysema, a condition that is typically benign and self-limited, as described in other reported cases (Figure 1).

Although spontaneous orbital emphysema has predominantly been described as a benign condition, the manner in which it presents can generate considerable clinical alarm, particularly when periorbital edema appears suddenly and with marked aesthetic changes. Several authors have pointed out that the pathophysiology involves not only the entry of air through occult microfractures, but also the presence of natural anatomical pathways that may act as conduits during abrupt increases in intranasal pressure. (13) This broader understanding of the mechanism explains why some patients develop more extensive emphysema or an unusual distribution, as observed by Koçak et al. (2009) and Akihiro et al. (2013), in which air extended into deep planes, mimicking an infectious emergency. (12) These findings are also consistent with those described by Sebastián Muñoz et al. (2020), who reported inferior spread into the malar region in the absence of trauma. (7)

Furthermore, the imaging findings associated with orbital emphysema not only allow establishment of the diagnosis but also help guide prognosis and prevent unnecessary interventions. Cossrow et al. (1977) emphasized that identification of extraconal air is key to distinguishing self-limited processes from those requiring urgent intervention. Similarly, Casarramona et al. (2014) and Ambroise Ingrid et al. (2018) demonstrated that, even in the absence of trauma, computed tomography can reveal a pattern of air distribution corresponding to well-defined pathophysiological mechanisms, thereby excluding severe infections. (10) These findings also complement those reported by Hung Yen et al. (2020), who documented a case initially interpreted as cellulitis until computed tomography revealed air within the orbital soft tissues. (9)

In this regard, appropriate recognition of this entity not only has immediate clinical value but also carries important therapeutic implications. The case series by Chandana et al. (2016) and Salar et al. (2019) show that a significant proportion of patients receive broad-spectrum antibiotics or even undergo unnecessary surgical evaluations before the diagnosis is confirmed. (2) Misinterpretation of the clinical presentation may lead to overtreatment, increased patient anxiety, and unnecessary additional investigations. Furthermore, unjustified antibiotic administration has been associated with a higher risk of adverse effects and generates selective pressure that contributes to the development of bacterial resistance, further emphasizing the need for accurate clinical identification. (8)

Finally, this case reinforces the importance of contextual clinical reasoning, as integrating the triggering mechanism, the benign clinical course, and radiological confirmation allows clinicians to avoid premature therapeutic decisions. In line with the reports by Tatli et al. (2015), Muñoz et al. (2020), and Hung Yen et al. (2020), this case underscores the need to recognize the characteristic patterns of spontaneous orbital emphysema in order to reduce morbidity, optimize conservative management, and contribute to the strengthening of the clinical literature with representative presentations. (3) Likewise, classic reports by Dobler et al. (1993) and Koçak et al. (2009) highlight that the initial appearance of orbital edema may lead to misdiagnoses of cellulitis or abscesses, reinforcing the importance of comprehensive evaluation. (13)

IV. CONCLUSIONS

The present case highlights the importance of timely recognition of post-Valsalva spontaneous orbital emphysema, a rare yet clinically alarming entity whose presentation may mimic serious infectious processes such as orbital cellulitis, periorbital abscesses, or complicated sinusitis. As demonstrated in the reviewed cases by Tatli et al., Çetinkaya et al., Saad et al., Moon et al., and Muñoz et al., abrupt increases in intranasal pressure can generate microfractures or anatomical dehiscences that allow air to enter the orbital space, producing a sudden clinical picture which, if not properly identified, may lead to incorrect diagnoses and inappropriate treatments.

This case underscores the relevance of an accurate diagnosis based on clinical–imaging correlation, as computed tomography remains the method of choice for distinguishing extraconal air from inflammatory processes. The evidence shows that incorrect interpretation of imaging findings may lead to unnecessary antibiotic use, invasive evaluations, and increased patient anxiety. Recognizing the characteristic patterns of spontaneous orbital emphysema allows for the adoption of safe conservative management, avoiding medical

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan240

interventions that provide no benefit and reducing the risk of morbidity and mortality associated with misdiagnosis.

Furthermore, this case emphasizes the need for clinical teams to consider this entity in the differential diagnosis of sudden periorbital edema, particularly when the clinical course is benign and there is a clear history of a Valsalva maneuver. The wide variability in its presentation, together with its initial similarity to infectious processes, highlights the importance of contextual clinical reasoning, supported by both pathophysiological understanding and tomographic findings.

Finally, the presentation of this case makes a meaningful contribution to the scientific literature, as it reinforces the importance of educating clinicians about this atypical yet not uncommon condition, whose early recognition helps avoid unnecessary investigations, inappropriate treatments, and additional healthcare costs. Future research may further explore predisposing factors, anatomical variability influencing the extent of air dissemination, and more efficient diagnostic strategies for patients with sudden orbital presentations. This case therefore provides useful evidence to improve diagnostic accuracy and promote appropriate management of spontaneous orbital emphysema, strengthening the existing body of knowledge in this area of clinical practice.

Table 1 Previously Reported Cases of Spontaneous Orbital Emphysema Following Valsalva Maneuvers

Autor	Age and gender	Medical history	Clinical Findings	Procedure	Management
Tatli et al. (2015).(3)	Male, 52 years	No traumatic history	Sudden periorbital edema following nose blowing, without severe pain or fever.	Computarized tomography showing extraconal air without fracture	Conservative management, rest, complete resolution
Çetinkaya et al. (2021).(13)	Female, 47 años	Not significant comorbidities	“Sudden eyelid edema, crepitus, and mild pain following nose blowing.”	Orbitary tomography that show lamina papyracea fracture and orbitary enfisema	observation, rest, pain control, resloution of the sypmtoms
Salar et al. (2019).(2)	Male, 34 años	Not previous trauma	“Sudden periorbital edema after a Valsalva maneuver; palpable crepitus.”	Tomography that confirmed extraconal aire without inflamatory sings	Conservative management in 43 case reports, most of them without needing of antibiotics
Sebastián Muñoz et al. (2020).(7)	Male, 29 años	No comorbodities, after a sneeze	“Orbital emphysema with extension to the malar region; no fever or visual deficit.	Tomography that shown subcutaneos and orbitary air with compromise of parasanal sinus	conservative management, clinical observation, spontaneous resolution of the sypmtoms

Table 2 Laboratory Findings at Presentation

Lab tests	Results
Sodium	136
Magnesiom	1.16
Chloride	87.4
Phosphorous	1.82
Leucocytes	6770
Linfocytes	2300
Neutrofils	3860
Hemoglobin	12.2
Ureic Nitrogen	16.1
PH	7.45
PO2	95.0
Lactate	1.5
PCR	10
Creatinin	0.95

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan240

➢ *Description: BUN: Blood Urea Nitrogen, CRP: C-reactive Protein*

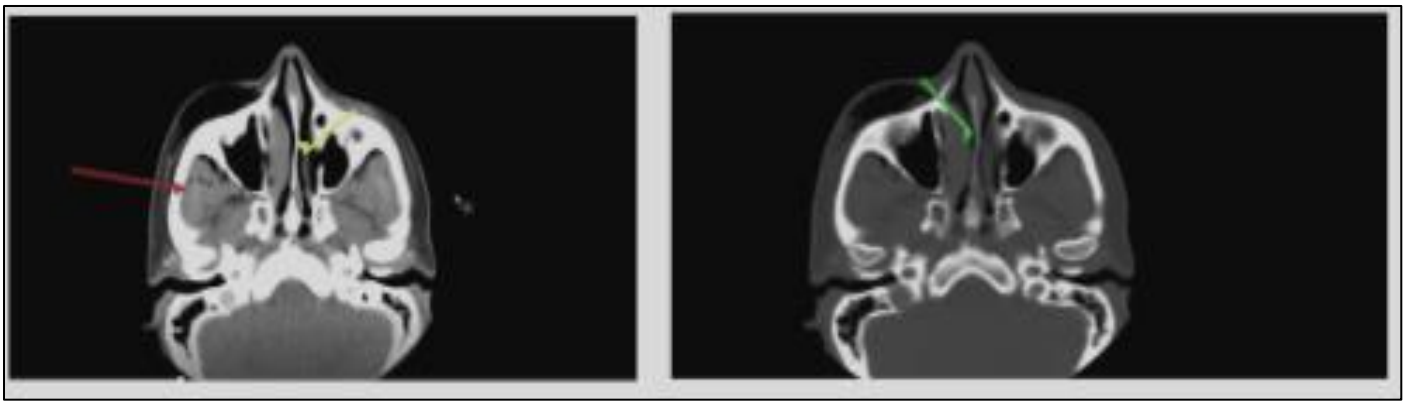

Fig 1 Computed Tomography Scan Showing Extraconal Orbital Emphysema in the Right Orbit, without Evidence of Overt Fracture

AKNOWLEDGMENTS

We express our sincere gratitude to the patient for granting informed consent for the publication of this case report. We also thank the emergency medicine physician, Dr. Juliana, for her guidance, mentorship, and support during the clinical management of the case. Likewise, we extend our appreciation to Fundación Santa Fe de Bogotá for granting access to the clinical information necessary for the preparation and publication of this report.

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