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CLINICAL INFORMATION

# Anesthetic management of late pressure angioedema

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**KEYWORDS**
Angioedema;
Pressure;
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**Abstract**
*Background and objectives:* Late pressure angioedema is a rare form of angioedema in which light pressure stimulus can lead to edema after 1–12 h. This uncommon and unreported entity is especially important in patients who undergo general anesthesia, for whom the usual harmless supine position, intravenous catheter insertion, standard monitoring, airway management and ventilation can lead to life threatening consequences as the trigger is a physical stimulus.
*Case report:* In this report, we describe a successful perioperative anesthetic management of a 30 year old patient, proposed for intra-ocular lens insertion, with a severe form of the disease with peri-oral, tongue and limb edema presentation.
*Conclusion:* Due to lack of quality evidence, our conduct was based on the pathophysiology mechanisms of the syndrome, histamine and pro-inflammatory cytokines release, with special focus on a careful peri-operative assessment and prophylaxis, minimization of all the possible pressure stimulus, especially in the airway structures, and a strict post-operative monitoring.


**PALAVRAS-CHAVE**
Angioedema;
Pressão;
Via aérea

**Manejo anestésico de angioedema de pressão tardio**

**Resumo**
*Justificativa e objetivos:* Angioedema de pressão tardio é uma forma rara de angioedema na qual um leve estímulo de compressão pode levar a edema após 1-12 horas. Essa entidade incomum e pouco relatada é especialmente importante em pacientes submetidos à anestesia geral, nos quais a habitual posição supina inofensiva, inserção intravenosa do cateter, monitoração padrão, manejo das vias aéreas e ventilação podem levar a consequências fatais, pois o gatilho é um estímulo físico.

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*Relato de caso:* Neste relato, descrevemos o manejo anestésico perioperatório bem-sucedido de um paciente de 30 anos de idade, agendado para inserção de lente intraocular, com uma forma grave da doença, apresentando edema perioral, língual e nos membros.
*Conclusão:* Devido à falta de evidências de qualidade, nossa conduta teve como base os mecanismos fisiopatológicos da síndrome, a liberação de histamina e citocinas pró-inflamatórias, com foco especial em uma avaliação cuidadosa no perioperatório e profilaxia, diminuição de todos os estímulos compressíveis possíveis, especialmente nas estruturas das vias aéreas, e um acompanhamento rigoroso no pós-operatório.


## Introduction

Late Pressure Angioedema (LPAE) is an infrequent entity characterized by swelling of the skin and deep soft tissues, 1–12 h after light pressure stimulus.[1–3] Occasionally erythema, pain, pruritus and flu-like symptoms and arthralgia coexist. Etiopathogenesis of LPAE is still unknown, although the available evidence suggests the involvement of mast cells and of several mediators other than histamine, such as pro-inflammatory cytokines.[2] The management of LPAE is complex, and prevention very difficult as the only known trigger is physical stimulus wich is almost impossible to abolish.[2,4]

In a surgical patient non-invasive manipulation such as supine positioning on the surgical table, face mask ventilation, oro-tracheal tube insertion, arm tourniquet for intravenous cannulation, usually harmless procedures, can lead to important complications in these patients.

Because only sparse and incomplete anesthetic management reports have been addressed in the literature, our procedures were the result of clinical judgment, according to the pathophysiology of the disease and their potential clinical implications.[5]

## Consent for publication

The patient reviewed the case report and gave written permission to the authors to publish the report. All the authors described in the case report participated in the care of the patient.

## Case report

A 30 year old male, with a history of late pressure angioedema presented for elective bilateral intra-ocular lens insertion due to severe myopia.

The patient reported the beginning of the angioedema symptoms 7 years ago. Since then symptoms occurred sporadically (3–4 times monthly) and were characterized only by edema, without erythema, pruritus, pain or other systemic symptoms, usually 5 h after stimulation with spontaneous resolution within hours. The edema was mainly in tongue and peri-oral region, usually triggered by light pressure (biting and manual pressure were the most common), he also reported occasional feet and hand edema. There was no history of anaphylaxis, urticaria, allergic reaction to food, drugs or environmental allergens or familiar history of angioedema. The patient had a regular follow up with an allergist and all the diagnostic test were negative, including blood count, C4 and C1 inhibitor levels and function (basal status and during an attack). TSH, free T4 and a thyroid autoantibodies levels were all within the normal limits.

The patient also had a history of a gastro-esophageal reflux and gastritis. He did not take any medications on a daily basis.

The patient had two previous surgeries: appendicectomy, 11 year ago performed under general anesthesia and herniorrhaphy, 8 year ago, performed with neuraxial anesthesia. There were no anesthetic complications with those procedures; however, both occurred prior to the first LPAE symptoms.

The patient was proposed to a bilateral intra-ocular lens insertion, a short procedure estimated to last 30 min performed in supine position.

At the pre-operative anesthetic appointment two weeks before the surgery, his physical examination was unremarkable.

We used the regular method of arm tourniquet for IV 20G cannulation in the surgery morning. One hour before the surgery 10 mg of dexametasone, 10 mg of metoclopramide and 50 mg of ranitidine were administrated intravenously. In the operating room the nurses and surgeons were all advised in order to minimize all the possible pressure stimulus.

We used standard monitoring, with extra care in the ECG electrodes and oxymeter placement. We choose to measure the arterial pressure every 15 min and when any hemodynamic alteration was suspected.

We performed a rapid sequence induction with midazolam (15 mcg.kg$^{-1}$); fentanyl (2 mcg.kg$^{-1}$), propofol (2 mg.kg$^{-1}$) and rocuronium (1 mg.kg$^{-1}$). The induction phase occurred uneventfully.

We used an *Airtraq* device for laryngoscopy and a reinforced tracheal tube. Intubation was successful at the first attempt and with only gentle pressure in the laryngeal structures, *cuff* pressure was monitored with a manometer (we established a 25 cm $H_2O$ cuff pressure, the lowest pressure without air leaks). The anesthetic maintenance was performed with sevoflurane (MAC 1).

The patient was ventilated in a volume controlled modality, with a tidal volume of 7 mL.kg$^{-1}$ with a 6 mm $H_2O$ PEEP, and there were not any complications or high airway pressures.

At the beginning of the procedure we also administered hidrocrotisone 3 mg.kg$^{-1}$. At the end we used paracetamol 1 g, ondansetrom 4 mg and sugamadex 2 mg.kg$^{-1}$, as we had a TOF ratio of 22%.

We used a special pressure relieving mattress and all peripheral pressure areas were padded.

The orotraqueal tube was extra-padded and the surgeon was advised for the extra care regarding patient head handling.

The emergence elapsed without any complications, and extubation was performed with minimal oral suction manoeuvers and with vigilance until complete awareness.

As the patient was a doctor he believed he could give warning before potential airway edema. He stayed at the post anesthetic care unit for 5 h without any hemodynamic instability, airway edema or any other symptoms; he did not complain of pain and was always awake and cooperative. During this period there were no signs of edema or erythema in the mouth or in any other location. He was transferred to the hospital inpatient unit were he stayed for another 3 h before he was discharged home by the surgeon. The next hours at home were uneventful.

## Discussion

Despite its rare incidence, in a surgical patient LPAE can have serious implications. Even small stimulus, that usually goes unnoticed, can cause severe complications. Anesthetic peri-operative optimization can be challenging but it can prevent serious events in perioperative period.

For a safe perioperative management first of all it is important to know the trigger stimulus in order to avoid or minimize them, because just lying in the surgical table can be a trigger in these patients.

The patient history could be compatible with other forms of edema, such as hereditary angioedema, auto-immune disease or associated with some specific causative factor such as environmental allergen. Those diagnosis would led to a very different approach, as there isn't the direct interference of histamine. As C4 and C1 inhibitor levels and function were normal, there were no familiar history of edema, there was no history of anaphylaxis and auto-immune tests were negative, it was assumed that the only trigger was physical – pressure. As the underlying physiopathological mechanism of LPAE is histamine and pro-inflamatory cytocines release, we acted according to it.

We chose a general anesthesia, because the loco regional techniques, as retro or peribulbar blocks, could create an intra orbitary pressure increment that could trigger angioedema with devastating consequences for the intra orbitary organ content, so this was not a suitable option.

Our first concern was the IV cannulation and arterial pressure monitoring. Despite our concern about the arm tourniquet pressure for Intravenous (IV) cannulation, the patient had a recent uneventful blood specimen collected so we used the regular method of arm tourniquet for IV 20G cannulation in the surgery morning inspite of ultrasound guided cannulation, that would have been an optimal option.

The patient explained that blood pressure measurements did not cause problems previously, and as this was a very short procedure, we opted for the regular techniques without the ultrasound guidance despite continuous arterial pressure monitoring with an arterial line was the safest option to avoid sphygomanometer use.

Theoretically pre-medication with corticoids and antihistaminics seems important to minimize unwanted side effects, so we used dexamethasone, hidrocrotisone and ranitide that had a double role as gastric acidity inhibitor and angioedema prophylaxis.

The airway management is the most delicate subject in this condition. Edema in the airway can be impossible to resolve or even to bypass and can lead to important morbidity or even death. Intense pressure stimulus during laryngoscopy, intubation and cuff inflation and face mask ventilation should be avoided, or when that is not possible, adjusted in a way that minimal pressure is applied. Rapid sequence induction seems to be a safer option in order to avoid hand and mask pressure in the face, lips and mandibula. For laryngoscopy we used an *Airtraq* device with only gentle pressure in the laryngeal structures to minimize the pressure and trauma of the laryncoscopic blade in the valecule an reduce the edema risk. We used a reinforced tracheal tube because of its pliability and atraumatic characteristics. As our patient had esophageal reflux and an uncuffed tube was not an option we used a cuffed tube, but despite the low pressure this pressure point was our main concern.

The post-anesthetic care in the PACU and inpatient unit is also an important period and the communication between anesthesit and other staff is essential to identify any problem in advance. An extended PACU stay is a safe measurement as an emergency management is usually faster as staff is well trained to deal with airway emergent complications and technical resources are easily available.

In conclusion there were several challenges and some technical improvisation was required due to lake of evidence. Surgical patients with LPAE can have serious post-operative complications but careful peri-operative assessment with minimization of all the possible pressure stimulus, especially in the airway structures, can avoid morbidity and allows an uneventful post-operative period.

## Conflicts of interest

The authors declare no conflicts of interest.

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