Orbital Apex Syndrome in an Uncontrolled Diabetes Mellitus Patient: Case Report

Astriani Rahayu[1], Olivia Putri Chairunnisa[1], Muhammad Yusran[2]

[1]General Practitioner, Department of Ophthalmology, Abdoel Moeloek Hospital, Lampung,

[2]Opthalmologist, Department of Opthalmology, Abdoel Moeloek Hospital, Lampung,

Abstract

Orbital Apex Syndrome (OAS) is a rare and severe neurological condition characterized by dysfunction of multiple cranial nerves, including II, III, IV, V1, and VI, which can rapidly progress and lead to permanent vision loss. This report describes a case of a 63-year-old male with uncontrolled diabetes mellitus, hypertension, and gout arthritis who presented with left periorbital pain, swelling, redness, followed by vision loss and ophthalmoplegia. Clinical examination revealed no light perception, severe ptosis, proptosis, reduced corneal sensation, and a relative afferent pupillary defect in the left eye. Laboratory findings showed leukocytosis and markedly elevated HbA1c levels. Brain computed tomography demonstrated opacification of the left ethmoid and sphenoid sinuses with enhancement at the left orbital apex, supporting the diagnosis of OAS secondary to bacterial sinusitis. Despite prompt clinical evaluation and planned further imaging, the patient's systemic condition rapidly deteriorated, leading to multi-organ failure and death before neurological improvement could be achieved. This case highlights the aggressive course of OAS in immunocompromised individuals, particularly those with poorly controlled diabetes. Inflammation and edema at the orbital apex can cause compression of multiple cranial nerves, resulting in visual impairment, ophthalmoplegia, and sensory deficits. Early recognition of symptoms, rapid diagnosis, and immediate multidisciplinary management, including targeted antimicrobial therapy and strict glycemic control, are essential to prevent irreversible complications and improve outcomes. OAS secondary to sinusitis should be strongly considered in patients presenting with painful ophthalmoplegia and visual loss, especially in those with significant metabolic comorbidities.

Keyword: Diabetes mellitus, orbital apex syndrome, sinonasal disease

Sindrom Apeks Orbita Sekunder akibat Penyakit Sinonasal pada Pasien dengan Diabetes Melitus Tidak Terkontrol: Laporan Kasus

Abstrak

Orbital Apex Syndrome (OAS) merupakan kondisi neurologis yang jarang dan berat, ditandai dengan disfungsi beberapa saraf kranial, yaitu II, III, IV, V1, dan VI, yang dapat berkembang cepat dan menyebabkan kehilangan penglihatan permanen. Laporan ini menggambarkan kasus seorang pria berusia 63 tahun dengan diabetes melitus tidak terkontrol, hipertensi, dan artritis gout, yang datang dengan keluhan nyeri periorbital kiri, pembengkakan, kemerahan, diikuti penurunan tajam penglihatan dan oftalmoplegia. Pemeriksaan klinis menunjukkan tidak adanya persepsi cahaya, ptosis berat, proptosis, penurunan sensasi kornea, serta defek pupil aferen relatif pada mata kiri. Pemeriksaan laboratorium menunjukkan leukositosis dan kadar HbA1c yang sangat tinggi. Tomografi terkomputasi otak memperlihatkan opasifikasi sinus etmoid dan sfenoid kiri disertai peningkatan kontras di apeks orbita kiri, yang mendukung diagnosis OAS sekunder akibat sinusitis bakteri. Meskipun evaluasi klinis telah dilakukan dengan cepat dan pemeriksaan lanjutan direncanakan, kondisi sistemik pasien memburuk secara cepat hingga terjadi gagal multiorgan dan kematian sebelum perbaikan neurologis dapat tercapai. Kasus ini menegaskan perjalanan OAS yang agresif pada individu imunokompromais, terutama pada pasien dengan diabetes yang tidak terkontrol. Inflamasi dan edema di apeks orbita dapat menekan beberapa saraf kranial sehingga menimbulkan gangguan penglihatan, oftalmoplegia, dan defisit sensorik. Pengenalan gejala secara dini, diagnosis cepat, serta penatalaksanaan multidisiplin segera, termasuk terapi antimikroba yang tepat dan kontrol glikemik ketat, sangat penting untuk mencegah komplikasi ireversibel dan memperbaiki luaran. OAS sekunder akibat sinusitis perlu dipertimbangkan pada pasien dengan oftalmoplegia nyeri dan gangguan penglihatan, terutama pada mereka yang memiliki komorbiditas metabolik signifikan.

Kata kunci: diabetes melitus, sindrom apeks orbita, penyakit sinonasal

Korespondensi: Astriani Rahayu, Perumdam II Sriwijaya, Bandar Lampung, HP: 081957124746, email: astrianirahayu94@gmail.com

Introduction

Orbital apex syndrome (OAS) is a complex neurological condition affecting multiple cranial nerves, including the Optic Nerve (II), Oculomotor nerve (III), Trochlear nerve (IV), Abducens nerve (VI), and the ophthalmic division of the trigeminal nerve (V1)[1]. Its causes range from infectious and inflammatory to traumatic, iatrogenic, hormonal, and neoplastic origins. These conditions often originate in nearby structures such as the paranasal sinuses or the orbit and then extend to the orbital apex[2].

In 2024, an estimated 588,7 million adults (aged 20 to 79 years) worldwide had diabetes mellitus, and this number is projected to rise to 852.5 million by 2050. A bidirectional relationship links diabetes and infectious disease. Diabetes is a predisposing factor in many infections, which continue to cause substantial morbidity and mortality[3]. The spread of infection may be facilitated by microbial toxins and endotoxins, such as lipopolysaccharides, which compromise tissue barriers and promote dissemina Ophthalmologytion[4].

Diabetes is also a recognised risk factor for fungal infections such as mucormycosis, especially during ketoacidosis. High ketone levels promote fungal growth by allowing them to utilise and produce ketoreductase[5]. Correctly identifying the underlying cause of this syndrome is essential for selecting suitable treatment options and a better outcome[1].

We present a case of orbital apex syndrome in a patient with uncontrolled diabetes mellitus, secondary to sphenoid and ethmoid sinusitis, to highlight the clinical presentation and diagnostic process.

Case Illustration

A 63-year-old male was referred from the Internal Medicine Ward Department at Abdoel Moeloek Hospital with complaints of swelling and pain around the left eye for one week. These symptoms were followed by decreased vision, redness, and drooping of the upper eyelid in the left eye. The patient reported pain in the upper left molars over the past two months, which had worsened over the previous week and was accompanied by swelling in the left cheek extending to the periorbital region and fever for a couple of days. There was no history of trauma or ocular surgery. The right eye was unaffected, and there were no similar complaints in the past.

The patient had a medical history of uncontrolled diabetes mellitus, hypertension, and gout arthritis. He had been receiving treatments from both a dentist and an internist. After several days of hospitalisation, the facial swelling improved, but ocular symptoms in the left eye persisted.

On ophthalmological examination, visual acuity in the left eye was no light perception (NLP) with normal intraocular pressure (IOP) at 12.1 mmHg. There were periorbital oedema, severe ptosis, and proptosis of the left eye (Figure 1). Corneal sensations were decreased in the left eye. Relative afferent pupillary defect (RAPD) was present in the left eye. The extraocular movements of the left eye were limited in all directions (Figure 2). Fundoscopy revealed optic nerve atrophy.

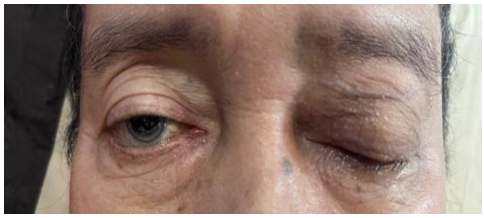

Figure 1. The facial appearance shows that the left eye is proptotic and fixed forward, with complete ophthalmoplegia and upper eyelid ptosis

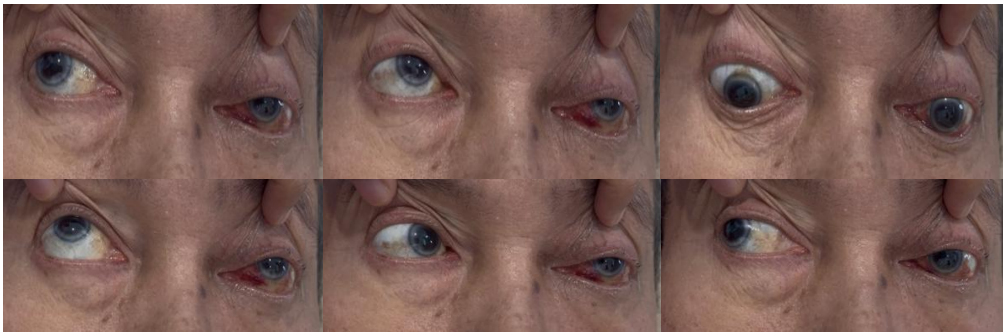

Figure 2. Restricted extraocular movements in all directions of the left eye

Laboratory findings revealed leukocytosis (WBC 20.610/µL), anaemia (Hb 10 g/dL), and an HbA1c level of 12%, indicating poor glycemic control. The patient underwent a brain Computerised Tomography (CT) scan, which showed abnormal enhancement in the left orbital apex and opacification of the left sphenoid and ethmoid sinuses (Figure 3). Based on clinical features, imaging, and laboratory findings, the patient was diagnosed with orbital apex syndrome of the left eye, secondary to ethmoid and sphenoid sinusitis.

Previously, the patient had received treatment from an internist and dentist that included intravenous antibiotics (ceftriaxone), metronidazole, and an antidiabetic drug (glicuidone). While further evaluation with brain MRI was planned, the patient's systemic condition deteriorated rapidly, and unfortunately, he died from multi-organ failure before neurological improvement could be observed.

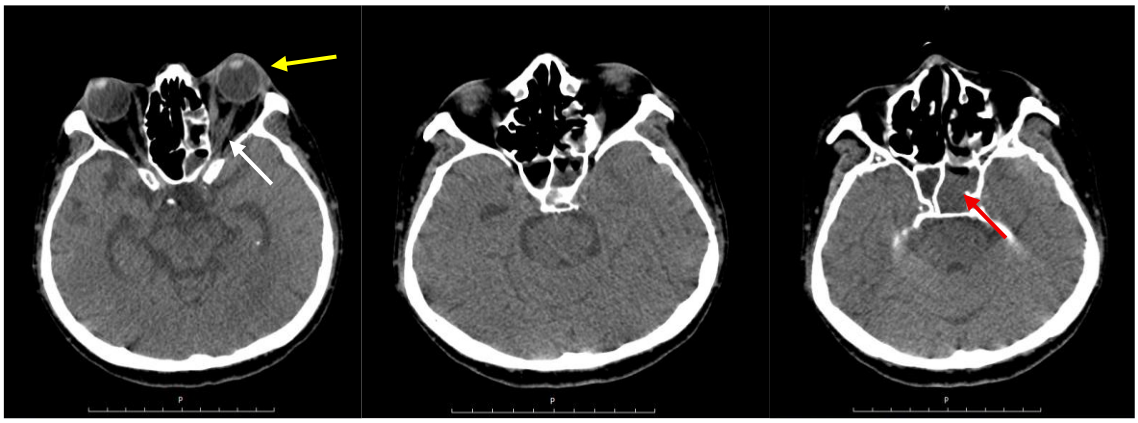

Figure 3. A brain CT scan showed proptosis left eye (yellow arrow), abnormal enhancement in the left orbital apex (white arrow) and opacification of the left sphenoid and ethmoid sinus (red arrow)

Discussion

The orbital apex is an opening that connects the orbit to the cranial cavity, comprising the optic canal, superior orbital fissure, and inferior orbital fissure[6,7]. The lesser wing of the sphenoid forms the roof of the orbital apex, the lateral wall by the greater wing of the sphenoid, the medial wall by the ethmoidal sinus, and the floor by the orbital plate of the palatine bone[8]. The optic canal is bordered by the sphenoid bone, with the lesser wing superiorly, the optic strut inferolaterally, and the body medially[6].

Orbital apex syndrome (OAS) is characterised by a group of signs and symptoms resulting from pathology at the

orbital apex. It affects cranial nerves II (optic), III (oculomotor), IV (trochlear), V1 (ophthalmic branch of the trigeminal), and VI (abducens), which can be caused by infections, inflammation, trauma, neoplasia, among other factors[9]. Clinical features typically include proptosis, impaired vision, a relative afferent pupillary defect (RAPD) due to optic nerve involvement, restricted eye movement because of involvement of the oculomotor, trochlear, and abducens nerves, facial pain and paresthesia over the forehead and upper eyelid resulting from trigeminal nerve involvement, and anisocoria caused by participation of the pupillary fibers[10]. Since the orbital apex is close to the paranasal sinuses, infections such as sinusitis can easily spread contiguously, especially from the ethmoid and sphenoid sinuses[11].

In the case described, the patient had uncontrolled diabetes, an elevated white blood cell count, fever, and rapidly progressing symptoms involving cranial nerves II to VI. These included ptosis, positive RAPD, restriction of eye movements in all directions, and vision loss. Fundoscopy revealed optic nerve atrophy. A Brain CT scan showed abnormal enhancement in the left orbital apex and opacification of the left sphenoid and ethmoid sinuses. This could suggest sinusitis leading to orbital apex syndrome.

OAS can be triggered by a wide range of infectious agents, including viruses, bacteria, fungi, and parasites. These organisms primarily involve surrounding structures such as the orbit or paranasal sinuses, from which they spread contiguously to the orbital apex, leading to the typical clinical features. Gram-positive cocci, such as *Staphylococcus* and *Streptococcus pneumoniae,* and gram-negative bacilli, including Pseudomonas, Klebsiella, Proteus, an d anaerobic bacteria, can cause sinusitis or orbital cellulitis that spreads to involve the orbital apex[11].

The high-risk group of patients includes those with immunocompromised conditions and individuals with uncontrolled hyperglycaemia. The spread of infection may be facilitated by microbial toxins and endotoxins, such as lipopolysaccharides, which compromise tissue barriers and promote dissemination[4].

Besides bacteria, OAS can also result from fungal infections. Mucormycosis ranks as the third most common fungal infection after candidiasis and aspergillosis, and it is particularly associated with the development of orbital apex syndrome. Key risk factors for rhino-orbito-cerebral mucormycosis include diabetes mellitus, ketoacidosis, immunosuppression, and increased serum iron levels. Elevated blood glucose and changes in tissue acidity create a conducive environment for fungal growth, while higher free serum iron in acidotic conditions further encourages fungal expansion and vascular invasion. The disease primarily spreads from the sinuses to the orbit and brain through angioinvasion, which results in thrombosis and tissue necrosis[13].

Therefore, in this case, we attributed the patient's orbital apex syndrome to sphenoid and ethmoid sinusitis. Notably, our patient has uncontrolled diabetes that causes an immunocompromised state, which likely contributed to the rapid progression of the infection from the sinuses to the orbital apex.

Inflammatory disease such as Tolosa Hunt Syndrome is also a common cause of OAS. Its symptoms include painful eye movements and limited eye movements. It is believed to be due to an abnormal autoimmune response and granulomatous inflammation affecting the orbital apex and cavernous sinus[14].

Diagnosis of OAS depends on clinical features and several tests. These tests include laboratory assessments such as complete blood count, peripheral smear, erythrocyte sedimentation rate, C-reactive protein, Gram stain, and blood agar culture, as well as imaging studies like CT scans and MRI[9]. A Brain CT scan can help visualise the paranasal sinuses to identify signs of sinusitis, pre-existing orbital cellulitis, or a subperiosteal abscess. Meanwhile, MRI typically shows hypointense signals on T1-weighted images and hyperintense signals on T2-weighted images. When the infection is localized to the orbital apex, it appears cone-shaped, whereas

involvement of the superior orbital fissure results in a dumbbell-shaped appearance[15].

There is a challenge to differentiate OAS from cavernous sinus syndrome (CSS) and superior orbital fissure syndrome (SOFS) because they have similar etiologies and symptoms that involve oculomotor nerves and trigeminal nerves; but only OAS involves the optic nerve[1].

Management of OAS depends on the underlying etiology. Bacterial infections respond to antibiotics[16]. Fungal infections, such as mucormycosis, are usually treated with an intravenous infusion of liposomal amphotericin B, a broad-spectrum antifungal agent, and aspergillosis is generally treated with intravenous voriconazole[17]. Virus infections respond with combined antiviral and steroid therapy[18].

Parasite infections respond with combined anti-helminthic agents and steroids to avoid adverse reactions due to intense inflammation caused by the death of the cestode[19]. Inflammatory causes are usually managed by systemic steroid therapy[20]. In the case of orbital apex syndrome secondary to trauma, surgery is required in appropriate clinical settings, and high-dose systemic steroids may also be necessary to reduce inflammatory soft tissue oedema and hematoma[15].

In this case, the patient already got antibiotics, antimicrobials and antidiabetics as initial treatment while undergoing any evaluation to search for the etiology. However, the rapid progression of clinical signs despite ongoing antibiotic therapy also raised suspicion of invasive fungal infection due to the patient's immunocompromised state.

The prognosis of OAS depends on the underlying etiology, the severity of nerve damage and the treatment used. Complications such as internal carotid artery involvement and cavernous sinus thrombosis are also observed, particularly in cases with delayed presentation[21].

Conclusion

This case highlights how uncontrolled diabetes can accelerate the progression of sinus infection to the orbital apex, leading to rapid neurovascular compromise. Despite prompt initiation of antimicrobial therapy and multidisciplinary management, the patient continued to deteriorate and ultimately died from complications of the disease. Early recognition, urgent interdisciplinary management, and strict glycemic control are essential to reduce the risk of irreversible morbidity and mortality in similar high-risk populations.

References

1. Badakere A, Patil-Chhablani P. Orbital apex syndrome: a review. Eye Brain. 2019;11:63-72.
2. Mohankumar A, Gurnani B. Orbital apex syndrome. [Updated 2023 Jun 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK592386/
3. Kim T, Choi SH. Diabetes Mellitus and Infectious Diseases: Current Evidence and Clinical Implications. Diabetes Metab J. 2025 Sep;49(5):915-933. doi: 10.4093/dmj.2025.0508. Epub 2025 Aug 27.
4. Chandrakiran C, Trupthi Uthappa. Orbital apex syndrome: an uncommon complication caused by a common nasal commensal. Bengal Journal of Otolaryngology and Head Neck Surgery. 2021;29:3
5. Talwar AA, Ricci JA. A meta-analysis of traumatic orbital apex syndrome and the effectiveness of surgical and clinical treatments. J Craniofac Surg. 2021 Sep 01;32(6):2176-2179.
6. Engin Ö, Adriaensen GFJPM, Hoefnagels FWA, Saeed P. A systematic review of the surgical anatomy of the orbital apex. Surg Radiol Anat. 2021 Feb;43(2):169-178.
7. Hu S, Colley P. Surgical Orbital Anatomy. Semin Plast Surg. 2019 May;33(2):85-91
8. Pooshpas P, Nookala V. Anatomy, head and neck, Optic Canal. 2023 Aug 8. In: StatPearls [Internet]. Treasure Island (FL):

StatPearls Publishing; 2025 Jan. Available from: https://www.ncbi.nlm.nih.gov/books/NBK545167/
9. Aryasit O, Preechawai P, Aui-Aree N. Clinical presentation, aetiology and prognosis of orbital apex syndrome. Orbit. 2013 Apr;32(2):91-4.
10. Pfeiffer ML, Merritt HA, Bailey LA, Richani K, Phillips ME. Orbital apex syndrome from bacterial sinusitis without orbital cellulitis. Am J Ophthalmol Case Rep.2018;10:84-86. doi: 10.1016/j.ajoc.2018.01.041.
11. Leung V, Dunn H, Newey A, O'Donnell B. Orbital apex syndrome in pseudomonas sinusitis after functional endoscopic sinus surgery. Ophthalmic Plast Reconstr Surg. 2018 Sep/Oct;34(5):e166-e168.
12. Anders UM, Taylor EJ, Martel JR, Martel JB. Acute orbital apex syndrome and rhino-orbito-cerebral mucormycosis. Int Med Case Rep J. 2015 Apr 17;8:93-6.
13. Yeh S, Foroozan R. Orbital apex syndrome. *Curr Opin Ophthalmol*. 2004;15(6):490–498. doi:10.1097/01.icu.0000144387.12739.9c
14. Goyal P, Lee S, Gupta N, Kumar Y, Mangla M, Hooda K, Li S, Mangla R. Orbital apex disorders: Imaging findings and management. Neuroradiol J. 2018 Apr;31(2):104-125.
15. Leferman CE, Ciubotaru AD, Ghiciuc CM, Stoica BA, Gradinaru I. A systematic review of orbital apex syndrome of odontogenic origin: Proposed algorithm for treatment. Eur J Ophthalmol. 2021 Jan;31(1):34-41.
16. Kim DH, Jeong JU, Kim S, Kim ST, Han GC. Bilateral orbital apex syndrome related to sphenoid fungal sinusitis. ear nose throat J. 2023 Dec;102(12): NP618-NP620.
17. Fukushima A, Mihoshi M, Shimizu Y, Tabuchi H. A Case of Orbital Apex Syndrome Related to Herpes Zoster Ophtalmicus. Cureus. 2022 Jul;14(7):e27254.
18. Koirala B, Shah S, Sitaula S, Shrestha GB. Orbital apex syndrome secondary to myocysticercosis: A case report from Nepal. Ann Med Surg (Lond). 2022 Aug;80:104336.
19. Chang CC, Chang YC, Su KY, Lee YC, Chang FL, Li MH, Chen YC, Chen N. Acute orbital apex syndrome caused by idiopathic sclerosing orbital inflammation. Diagnostics (Basel). 2022 Dec 01;12(12)
20. Bavikar P., Mehta V. Rhino-orbital-cerebral mucormycosis: a fatal complication of uncontrolled diabetes mellitus. Cuneus. 2017;9:e1841. doi: 10.7759/cureus.1841
21. Martel, J., Anders, U., Taylor, E., & Martel, J. (2015). Acute orbital apex syndrome and rhino- orbito-cerebral mucormycosis. International Medical Case Reports Journal, 93. https://doi.org/10.2147/IMCRJ.S83036