MEGA JOURNAL OF CASE REPORTS

OPEN ACCESS

Case Presentation

Compiled Date: June 16, 2025

Post Traumatic Enophthalmos Associated to Silent Sinus Syndrome: Case Report

Joye J* and Eloy Ph

Department of ENT & HNS, CHU UCL Namur, Belgium

***Corresponding author**: Juliette Joye, Department of ENT & HNS, CHU UCL Namur, Avenue Gaston Therasse 1, 5530 Yvoir, Belgium

Introduction

Silent Sinus Syndrome (SSS) is a rare but distinct clinical entity characterized by spontaneous enophthalmos and hypoglobus associated with maxillary sinus atelectasis and collapse of the orbital floor, in the absence of sinonasal symptoms [1]. The term was introduced in 1964 by Montgomery et al, then coined by Soparkar et al. in 1994 [2]. It was also named "imploding maxillary sinus" by Rose, a famous UK ophtalmologist, in 2003 [3,4]. While traditionally considered spontaneous, an increasing number of cases describe (1) post-surgical forms after functional endoscopic sinus surgery and septorhinoplasty [5], and (2) post-traumatic forms of SSS [6,7]. An orbital trauma may either unmask a previously silent condition or initiate the cascade of sinus implosion [8]. Orbital blowout fractures typically affect the orbital floor but also exacerbate pre-existing asymptomatic conditions such as atelectasia of the maxillary sinus [9]. The diagnosis is based on high-resolution CT imaging. The treatment is still debated to this date. Functional endoscopic sinus surgery via middle meatal antrostomy to restore sinus ventilation is the cornerstone of management, but the timing and necessity to perform orbital reconstruction remains controversial.

This report presents the case of a post-traumatic orbital floor fracture in a patient later diagnosed with silent sinus syndrome, highlighting the importance of recognizing underlying sinus disease in facial trauma evaluation.

Keywords: Atelectasia of the maxillary sinus; Silent sinus syndrome; Implosion of the maxillary sinus; Blowout fracture; Orbital floor fracture

Case Presentation

A 52-year-old man came to the emergency department of another hospital because he had

contusion on his face due to a quarrel. He had noticeable facial swelling and reported mild hypoesthesia of the right cheek. There was no diplopia, no subcutaneous emphysema, and no reduction in visual acuity. An emergency CT scan was performed, revealing a fracture of the right orbital floor without muscle entrapment and right maxillary hemosinus **(Figure 1).** The patient was assessed by a maxillofacial surgeon, who recommended conservative management with anti-inflammatory medication and antibiotic therapy. No surgical intervention was deemed necessary at that time. Four months later, the patient was referred to our center due to widening of the palpebral fissure and persistent hypoesthesia of the right cheek **(Figure 2)**. He complains of painful discomfort in the right zygomatic region, accompanied by intermittent epiphora. There was still no diplopia and visual acuity was preserved. A new CT scan was performed and confirmed the fracture of the orbital floor, which was now lower that the orbital floor of the other side. Additional findings included the total opacification of the right maxillary sinus with posterior wall retraction and partial opacification of the lateral aspect of the right frontal sinus **(Figure 3).** An ophthalmologic evaluation was subsequently conducted and confirmed the presence of enophthalmos. Finally, the stomatologist concluded that the right orbital floor fracture would require surgical repair with a titanium implant to reduce the enophthalmos.

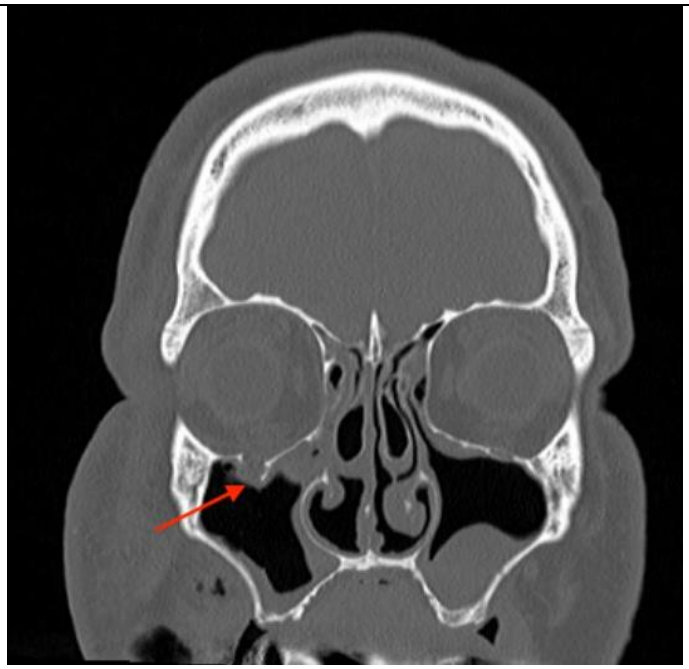

Figure 1: Initial coronal CT scan (bone window) revealing the fracture of the right orbital floor (arrow) without muscle entrapment.

Figure 2: Frontal view (left) and lateral view (right) of the patient demonstrating enophthalmos of the right eye.

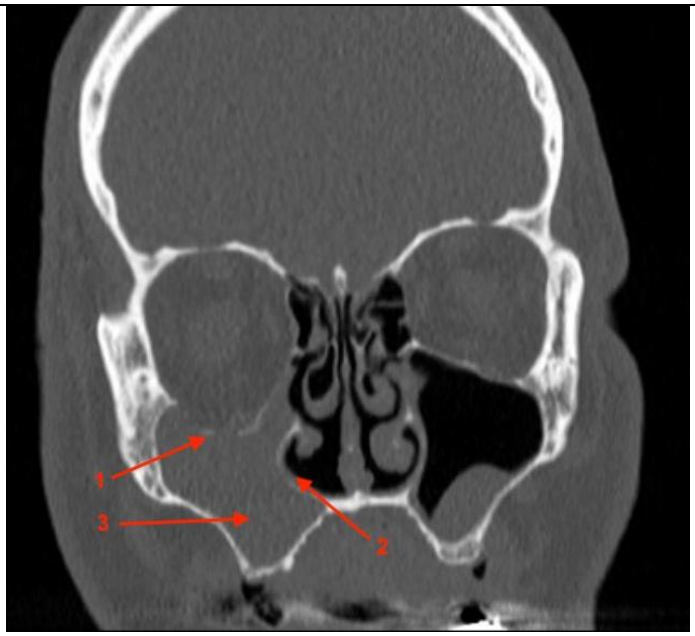

Figure 3: Four months later coronal CT scan (bone window) demonstrating a retraction of the right orbital floor with an increase of the orbital volume (1), a retraction of the inter sinonasal wall (2), and a complete opacification of the right maxillary sinus (3).

Discussion

The maxillary sinuses are air-filled cavities that communicate with the nasal cavity through the maxillary ostium. Disruption in ventilation and drainage due to ostial obstruction can lead to a spectrum of disorders including Chronic Maxillary Atelectasis (CMA) and Silent Sinus Syndrom (SSS) [10].

CMA is defined as an acquired, progressive inward retraction of the maxillary sinus walls, leading to a decrease in sinus volume [11]. Kasset al. proposed a classification in 1997 [12]:

- **Grade I:** Membranous deformity (lateralised maxillary fontanelle)
- **Grade II:** Bony deformation (inward bowing of one or more osseous walls of maxillary antrum)
- **Grade III:** Clinical deformity with enophthalmos or hypoglobus (marked deformation of the antral walls, enophthalmos, hypoglobus, mid facial deformity)

SSS is considered a late-stage manifestation of CMA, presenting with enophthalmos, hypoglobus, and

collapse of the maxillary sinus. Typically, the patient has no sinonasal symptoms. However, in many cases, this condition is diagnosed by an imaging performed during a complete diagnostic workup for sinonasal complaints [13-15]. The pathogenesis for SSS is not clearly elucidated. The central mechanism is chronic maxillary ostial obstruction, leading to negative pressure within the sinus. This causes an implosion of the maxillary cavity with thinning and retraction of the different bony walls of the maxillary sinus. At the end of the process, complete aspiration of the sinus wall with retraction of the inter sinonasal wall and the orbital floor will occur. This can ultimately lead to enophthalmos, diplopia and visual impairment. Thus, the diagnosis relies on high-resolution CT imaging showing classic signs: maxillary sinus opacification, inward bowing of sinus walls, retraction of the orbital floor, and lateralization of the uncinate process and middle turbinate. The uncinate process is then fused to the periorbit [16].

Although the differential diagnosis is relatively limited, the following conditions should be considered in the evaluation of a patient with suspected SSS:

- Congenital hypoplasia of the maxillary sinus [17]
- Post-traumatic maxillary sinus deformity [18]
- Inferior orbital decompression: cases of delayed onset enophthalmos and hypoglobus after bone removing orbital decompression for thyroid orbitopathy have been reported [19,20]
- Maxillary mucocele [21]
- Chronic sinusitis with associated mucoperiosteal thickening [22]

Although SSS is classically described as a spontaneous condition, recent literature highlights post-traumatic cases where orbital fracture leads to or unveils sinus collapse. In these cases, the trauma initiates or accelerates maxillary sinus atelectasis through distortion of the ostiomeatal complex [23-29].

Orbital fractures are commonly classified into three main categories [30]:

- **Orbital rim fractures**: They typically involve multiple break points and result from a high impact focal trauma. They include Tripod/Zygomatic Complex (ZMC) fractures and Le Fort fractures.
- **Comminuted orbital wall fractures**: Most common in adults. They result from either a blowout mechanism due to a sudden increase in intraorbital pressure or a buckling effect following forceful impact to the orbital rim. This often leads to enophthalmos and mobility restrictions.
- **Trapdoor fractures**: Most common in children and adolescents. They are minimally displaced fractures of the orbital floor that have spontaneously reduced to its original position, due to the elasticity of the pediatric bone, incarcerating an extraocular muscle.

In the present case, the patient sustained facial injury following a physical altercation, leading to a blowout fracture of the orbital floor. The blunt trauma caused a sudden increase in intraorbital pressure, which was transmitted to the orbital floor, causing it to fracture outward into the maxillary sinus. The fracture was easier to happen as the floor was thinned due to the atelectasia of the maxillary sinus. The treatment of orbital floor fractures depends on the severity of the

symptomatology and the association or not of an engagement of the inferior orbital muscle. Various materials have been used for orbital reconstruction, from autologous bone grafts to synthetic implants. Recently, Patient-Specific Implants (PSIs) have gained interest for their precision, reduced surgical time, and improved cosmetic results [31].

The management of this condition involves two key components:

- **Endoscopic Sinus Surgery**: A middle meatal antrostomy is performed to reestablish sinus ventilation and stop the implosive process.
- **Orbital Floor Reconstruction**: This is debated. Some studies report a re-expansion of the sinus cavity after the middle antrostomy, making it not necessary to surgically repair the orbital floor [32-34].The orbital floor reconstruction is considered when significant enophthalmos or hypoglobus persists after sinus surgery. The next question is to know if the orbital floor repair must be done at the same time of the sinus surgery or in a second step. Some authors support a combined single-stage procedure for faster recovery, especially when facial asymmetry is prominent [35]. Other authors prefer a two-stage approach to reduce the risk of infection or overcorrection [36]. For instance, Babar-Craig et al. recommend waiting six months after FESS [37]. We opted for a two-step management. First, a middle meatal antrostomy to halt sinus implosion. Then, a titanium implant to repair the orbital floor and to address the persistent enophthalmos.

Conclusion

This case illustrates how a seemingly minor orbital trauma can either reveal or precipitate a previously asymptomatic silent sinus syndrome. In our patient, a blowout fracture occurred through an already thinned and retracted orbital floor, with no muscle entrapment and initially minimal symptoms. A thorough examination of the sinus CT-scan is therefore of paramount importance. Management of such cases must be individualized. While endoscopic sinus surgery alone may suffice in early or mild cases, patients with significant enophthalmos or facial asymmetry often require orbital floor reconstruction. The timing of this intervention remains debated. In this case, a two-stage approach was chosen: a middle antrostomy to stop the implosion of the maxillary sinus and a titanium implant to correct the enophthalmos.

References

1. Pula JH, Mehta M. Silent sinus syndrome. Curr Opin Ophthalmol. 2014;25:480–4.
2. Soparkar CN, Patrinely JR, Cuaycong MJ, et al. The silent sinus syndrome. A cause of spontaneous enophthalmos. Ophthalmology. 1994;101:772–8.
3. Rose GE, Sandy C, Hallberg L, et al. Clinical and radiologic characteristics of the imploding antrum, or "silent sinus," syndrome. Ophthalmology. 2003;110:811–18.
4. Levine SB, Mitra S. Maxillary sinus involution after endoscopic sinus surgery in a child: a case report. Am J Rhinol. 2000;14(1):7-11.
5. Eloy JA, Jacobson AS, Elahi E, Shohet MR. A method for ventilating patients during laryngoscopy. Laryngoscope. 2006;116(6):1035-8.
6. Catalfamo L, Siniscalchi EN, De Ponte FS, De Rinaldis D. Post-traumatic Sinus Syndrome, Proposal for a New Clinical

Entity (CDR Syndrome) as Variant of the Silent Sinus Syndrome: Systematic Review and Case Series. Indian J Otolaryngol Head Neck Surg. 2024;76(1):1378-1388.

7. Cobb AR, Murthy R, Cousin GC, El-Rasheed A, Toma A, Uddin J, et al. Silent sinus syndrome. Br J Oral Maxillofac Surg. 2012;50(6):e81-5.
8. Brown S J, Hardy T G, McNab AA. "Silent Sinus Syndrome" Following Orbital Trauma: A Case Series and Review of the Literature. Ophthalmic Plast Reconstr Surg. 2017;33(3):209-212.
9. Canzi G, Morganti V, Novelli G, Bozzetti A, Sozzi D. Posttraumatic delayed enophthalmos: analogies with silent sinus syndrome? case report and literature review. Craniomaxillofac Trauma Reconstr. 2015;8(3):251-6.
10. de Dorlodot C, Collet S, Rombaux P, Horoi M, Hassid S, Eloy P. Chronic maxillary atelectasis and silent sinus syndrome: two faces of the same clinical entity. Eur Arch Otorhinolaryngol. 2017;274(9):3367-3373.
11. Kass ES, Salman S, Rubin PA, et al. Chronic maxillary atelectasis. Ann Otol Rhinol Laryngol. 1997;106(2):109-16.
12. Ende K, Mah L, Kass ES. Progression of late-stage chronic maxillary atelectasis. Ann Otol Rhinol Laryngol. 2002;111(8):759-62.
13. Ferro A, Basyuni S, Santhanam V. Not so silent sinus syndrome: A case report. Int J Surg Case Rep. 2016;23:1-3.
14. Wan MK, Francis IC, Carter PR, Griffits R, van Rooijen ML, Coroneo MT. The spectrum of presentation of silent sinus syndrome. J Neuroophthalmol. 2000;20(3):207-12.
15. Defauw M, Saerens M, De Dorlodot Cl, Eloy Ph. Small Primary Maxillary Sinuses: Different Clinical Entities but Same Surgical Hazard. Ann Case Rep. 2022;7:759.
16. Illner A, Davidson HC, Harnsberger HR, Hoffman J. The silent sinus syndrome: clinical and radiographic findings. AJR Am J Roentgenol. 2002;178(2):503-6.
17. Freiser ME, McCoy J, Shaffer AD, Stapleton AL. Silent sinus syndrome in children. Int J Pediatr Otorhinolaryngol. 2020:134:110034.
18. Millis MC. A case of silent sinus syndrome following a history of multiple facial traumas. Clin Exp Optom. 2021;104(2):262–263.
19. Rose GE, Lund VJ. Clinical features and treatment of late enophthalmos after orbital decompression: a condition suggesting cause for idiopathic ‘‘imploding antrum’’ (silent sinus) syndrome. Ophthalmology. 2003;110:819–826.
20. Long JA, Baylis HI. Hypoglobus following orbital decompression for dysthyroid ophthalmopathy. Ophthalmic Plast Reconstr Surg. 1990;6(3):185-9.
21. Tan TY, Shashinder S, Subrayan V, Krishnan G. Silent sinus syndrome due to a maxillary mucocele. Auris Nasus Larynx. 2008;35(2):285-7.
22. Jafari-Pozve N, Sheikhi M, Ataie-Khorasgani M, Jafari-Pozve S. Aplasia and hypoplasia of the maxillary sinus: A case series. Dent Res J (Isfahan). 2014;11(5):615-7.

23. Ross JJ, Kersten RC. Late enophthalmos mimicking silent sinus syndrome secondary to orbital trauma. J Craniofac Surg. 2005;16:840–3.
24. Brown SJ, Hardy TG, McNab AA. "Silent Sinus Syndrome" Following Orbital Trauma: A Case Series and Review of the Literature. Ophthalmic Plast Reconstr Surg. 2017;33(3):209-212.
25. Montezuma SR, Gopal H, Savar A, Turalba A, Cestari DM, Torun N. Silent sinus syndrome presenting as enophthalmos long after orbital trauma. J Neuroophthalmol. 2008;28(2):107-10.
26. Ramanujam S, Srinivedha CV, Kanniyappan B, Reddy D. Silent Sinus Syndrome Post Trauma: A Case Report and Literature Review. Cureus . 2023;15(9):e45740.
27. Pawar SS, Hong S, Poetker DM. Delayed presentation of silent sinus syndrome after orbital trauma. Am J Otolaryngol. 2010;31(1):61-3.
28. Février E, Vandersteen C, Castillo L, Savoldelli C. Silent sinus syndrome: A traumatic case. J Stomatol Oral Maxillofac Surg. 2017;118(3):187-190.
29. Gagnon MR, Yeatts RP, Williams Z, et al. Delayed enophthalmos following a minimally displaced orbital floor fracture. Ophthal Plast Reconstr Surg. 2004;20:241–3.
30. Phan LT, Jordan Piluek W, McCulley TJ. Orbital trapdoor fractures. Saudi J Ophthalmol. 2012;26(3):277-82.
31. Tousidonis M, Alvarez-Mokthari S, Khayat S, Sanjuan de Moreta G, Ochandiano S. Contemporary Treatment of Silent Sinus Syndrome: A Case Report and Literature Review. Cureus. 2024;16(4):e57577.
32. Rosso C, Saibene AM, Felisati G, Pipolo C. Silent sinus syndrome: systematic review and proposal of definition, diagnosis and management. Acta Otorhinolaryngol Ital. 2022;42:305-16.
33. Sivasubramaniam R, Sacks R, Thornton M. Silent sinus syndrome: dynamic changes in the position of the orbital floor after restoration of normal sinus pressure. J Laryngol Otol. 2011;125:1239-43.
34. Thomas RD, Graham SM, Carter KD, Nerad JA. Management of the orbital floor in silent sinus syndrome. Am J Rhinol. 2003;17:97–100.
35. Bossolesi P, Autelitano L, Brusati R, Castelnuovo P. The silent sinus syndrome: diagnosis and surgical treatment. Rhinology. 2008;46:308–316.
36. Vander Meer JB, Harris G, Toohill RJ, Smith TL. The silent sinus syndrome: a case series and literature review. Laryngoscope. 2001;111:975–978.
37. Babar-Craig H, Kayhanian H, De Silva DJ et al. Spontaneous silent sinus syndrome (imploding antrum syndrome): case series of 16 patients. Rhinology. 2011;49:315–317.

Citation of this Article

Joye J and Eloy Ph. Post Traumatic Enophthalmos Associated to Silent Sinus Syndrome: Case Report. Mega J Case Rep. 2025;8(6):2001-2008.

Copyright