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# An Unusual Maxillary Sinus Foreign Body: A Case Report

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**Conflict of interest:** None declared

**Patient:** Male, 32-year-old  
**Final Diagnosis:** Foreign body in maxillary sinus  
**Symptoms:** Blindness • eye bleeding • eye pain • history of trauma  
**Medication:** —  
**Clinical Procedure:** Caldwell-Luc  
**Specialty:** Otolaryngology

**Objective:** Unusual clinical course


**Background:** Paranasal sinus foreign bodies are rarely encountered in otolaryngology practice.

**Case Report:** We present the case of a 32-year-old man who presented to our Emergency Department with his left eye bleeding after a nail gun injury. The initial physical examination revealed the presence of a left eye ruptured globe, which led to left eye blindness. An urgent plain X-ray scan was done, in which the presence of a metallic object impacted in the left maxillary sinus was demonstrated. The patient was managed surgically by an external approach using the Caldwell-Luc procedure, with no intra- or postoperative complications.

**Conclusions:** Paranasal sinus foreign bodies, if improperly treated, can cause serious morbidity. Surgical removal, either endoscopically or through an external approach, is required.

**Keywords:** Foreign Bodies • Maxillary Sinus • Paranasal Sinuses

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## Background

Foreign bodies are frequently encountered in ENT practice, and are commonly found in the nasal cavities, ears, and pharynx [1]. However, a foreign body in the paranasal sinuses is rare, about 80% of which occur in the maxillary sinus [1,2].

There are 2 main causes of paranasal sinus foreign bodies. The most common is iatrogenic, which is a consequence of dental, ophthalmic, and otorhinolaryngological procedures, and makes up 60% of cases [1,2]. The other cause is traumatic incidents, which account for 25% of cases [2]. Traumatic foreign bodies can be a result of direct external trauma to the sinus, or indirectly through orbital or palate injuries [3]. Foreign bodies may consist of various substances such as dental implants, tooth roots, wooden sticks, toothpicks, needles, plastic, glass, metal, and bullets [1-3]. These are usually detected when a patient has unexplained rhinosinusitis, or as an accidental finding during radiological examination [2]. If the foreign body was not removed from the sinus, it can lead to serious complications such as sinusitis, inflammatory reactions, and fungal infections [1,4].

There are different methods used to extract foreign bodies from the sinus. The type of management is determined by the size, shape, and location of the foreign body [2,3]. The Caldwell-Luc procedure, the lateral window approach, and endoscopic sinus surgery are common procedures used for the removal of foreign bodies [4,5].

This report presents a case of a foreign body identified in the maxillary sinus caused by penetration of the orbital cavity, which was removed by Caldwell-Luc procedure.

## Case Report

A 32-year-old man, working as a laborer and not known to have any medical illness, presented to the ER with bleeding in the left eye after trauma 1 hour earlier.

The patient sustained the injury while he was using a nail gun to fix a nail in a roof. The nail reflected from the roof to his left eye, and he presented to the ER 1 hour after the time of injury, with bleeding and severe pain in the left eye.

It was associated with loss of vision from the left eye and paresthesia and numbness in the left side of the face.

On examination the patient was conscious and was alert and oriented to time and place on arrival to the ER. He was in severe pain, with active bleeding in the left eye. His vital signs were stable.



**Figure 1.** Lateral plain X-ray of the head shows abnormal curved radio-opaque shadow (metallic object).

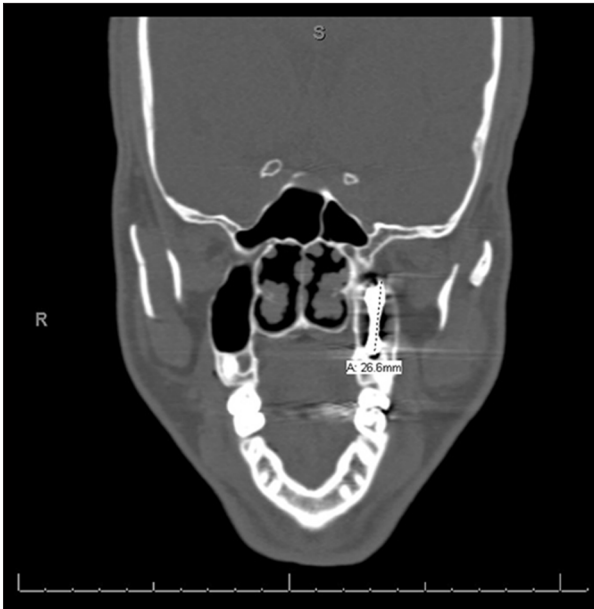
The patient presented with a severe rupture globe injury with no light-perception vision. The rupture globe injury led to uveal prolapse, hemorrhagic choroidal detachment, and retinal detachment in all 4 quadrants. The case was managed by the Ophthalmology Department, with poor outcomes. The final result was complete loss of vision in the left eye.

The patient was sent to the Radiology Department for a plain head X-ray (anterior-posterior [AP] and lateral). The X-ray showed an abnormal curved radio-opaque shadow (metallic object) projected over the left maxillary antra with a pointed end extending to the left alveolar margin (**Figure 1**).

Then, the patient was prepared and shifted to the operating room (OR) immediately as an emergency case in order to save the left eye. In the OR, the ruptured globe was assessed and evaluated as a full-thickness scleral wound extending from the limbus all the way posteriorly, involving damage to the rectus muscle and loss of nonviable uveal tissue. The wound was sutured with a Vicryl 8.0 suture, and the full-thickness wound in the upper lid involving the lid margin was sutured with 6.0 Vicryl.

A CT scan with 3D reconstruction for sinus and paranasal sinus without contrast was done after the stabilization of the patient by the ophthalmology team in the OR. The CT scan showed a ruptured left globe with fracture of the left inferior orbital wall, which was identified as the region of the nail entry, fat herniation from the same opening, and a retained large dense foreign body in the left maxillary sinus (**Figure 2**).

An endoscopic examination was done, in which nasal cavity and nasal mucosa were found to be normal, without any obvious injury. The patient was prepared for surgery the next day



**Figure 2.** CT scan of the sinuses, coronal view, shows a large dense foreign body in the left maxillary sinus.



**Figure 3.** Maxillary antrum opened during Caldwell-Luc procedure shows the foreign body during removal.

to remove the nail from the maxillary sinus using Caldwell-Luc procedure.

After opening the maxillary antrum in the OR, a nail was found impacted in the inferior maxillary wall in the second premolar region (**Figure 3**). Premolar teeth were stable, with no perforation in the hard palate.



**Figure 4.** Foreign body after removal from the maxillary sinus (about 4 cm in length).

The foreign body (the nail) was identified and removed (it was about 4 cm in length) (**Figure 4**).

Irrigation of the maxillary sinus with diluted betadine was performed. The sublabial incision was closed with catgut suture 2.0.

A plain X-ray was repeated after surgery, showing mild bilateral opacification of the maxillary antra.

Finally, follow up with the patient was conducted 1 week after the operation, in an out-patient clinic. There was complete loss of vision in the left eye. The original wound and the wound resulting from the Caldwell-Luc operation were within normal parameters of healing, without any infection or signs of inflammation.

## Discussion

Foreign bodies (FB) can be presented in the maxillary sinus by traumatic or non-traumatic causes.

Gurkan et al (2014) found ectopic 3<sup>rd</sup> molar teeth in the right maxillary sinus as a non-traumatic cause [6]. The traumatic causes can be classified as accidental or iatrogenic [7]. The presence of pieces of glass [8], a ballpoint pen [9], and multiple wood and plastic pieces [10] are considered accidental causes.

On review of literature, the majority of iatrogenic cases are caused by the presence of tooth implants (54%) [11], tooth root [12-14], and surgical bur [15] (**Table 1**).

**Table 1.** Summary of some reported cases of foreign bodies in the maxillary sinus.

Accidental												
#	Author (reference)	Age	Type of FB	Mechanism of injury	Route of entry	Presentation	Time gap between procedure, event and diagnosis	Site of FB	Size	Complications	Management	Outcome
1	Our case (2020)	32	Metallic nail	By a nail gun	Floor of orbital cavity	Left eye bleeding and left cheek parasthenia and numbness	1 hour	Left Maxillary sinus	4 cm	Left eye blindness	Caldwell-Luc procedure	Clear maxillary sinus, no evidence of disease after 1 week
2	Nataraj et al [8] (2015)	25	Pieces of glass	RTA	Facial wounds	Recurrent headache, Left nasal discharge and post nasal drip, Watering of the left eye	3 months	Left maxillary sinus		Sinusitis Nasolacrimal duct obstruction	Functional Endoscopic Sinus Surgery (FESS) and Endoscopic dacryocystostomy	Free of symptoms after 1 month
3	Gurkan et al [6] (2015)	46	3 <sup>rd</sup> Molar teeth	Congenital		Continuous nasal obstruction, postnasal discharge, and severe facial pain	3-4 years	Right maxillary sinus		Sinusitis	Caldwell-Luc procedure	Free of symptoms after 1 year
4	Kim et al [9] (2014)	13	Ballpoint pen	Fall down	Facial wound	Eyelid laceration	Immediately	Right orbit extending into the sphenoid sinus	8×1 cm	None.	ESS	
5	Shao et al [17] (2014)	10	Hand sewing needle	Voluntarily introduced by the patient	Through carious tooth	Primary maxillary right first molar was carious, serious red swelling of the buccal mucosa	1 day	Right maxillary sinus	4.2 cm	Sinusitis	Removed with magnetic iron under local anesthesia	Free of symptoms after 2 months
6	Agarwal et al [7] (2014)	28	pressure cooker nozzle	Blast injury	Facial wounds	Upper lip split and laceration of upper gingivobuccal sulcus with active bleeding	NA	Maxillary sinus	NA	None	Taken out by manipulation with a long-toothed forceps	NA
7	Agarwal et al [7] (2014)		Bullet	NA	Anterior wall of maxillary sinus	Face laceration	Immediate	Maxillary sinus	NA	NA	Caldwell-Luc procedure	NA
8	Saeed et al [28] (2013)	45	Shell cases	NA	Anterior wall of maxillary sinus	Face laceration	Immediate	Maxillary sinus	NA	NA	Caldwell-Luc procedure	NA

**Table 1 continued.** Summary of some reported cases of foreign bodies in the maxillary sinus.

#	Author (reference)	Age	Type of FB	Mechanism of injury	Route of entry	Presentation	Time gap between procedure, event and diagnosis	Site of FB	Size	Complications	Management	Outcome
9	Şahin et al [22] (2012)	24	Wooden toothpick	Unknown, may be introduced accidentally or voluntarily by the patient	Oroantral fistula (now healed) after dental extraction	Headache, nasal obstruction, halitosis, chronic purulent rhinorrhea from the left nostril, and postnasal drip	3 years	Left maxillary sinus		Unilateral chronic sinusitis	Combined endoscopic and Caldwell-Luc procedure	Free of symptoms
10	Batista et al [29] (2011)	NA	Zinc oxide cement	NA	Oroantral fistula	Postnasal discharge	1 month	Maxillary sinus	NA	NA	Caldwell-Luc procedure	NA
11	Kaushik et al [23] (2009)	65	Cotton ribbon gauze	NA	Oroantral fistula after dental extraction	Regurgitation of fluids into the nose and left maxillary sinus tenderness	7 months	Left maxillary sinus	NA	NA	Caldwell-Luc procedure	NA
12	Prasant et al [27] (2009)	NA	Matchsticks	NA	Oroantral fistula	Facial swelling	20 days	Maxillary sinus	NA	NA	Oral exploration in GA followed by Caldwell-Luc for inspection	NA
13	Lima et al [10] (2008)	49	Multiple wood and plastic pieces	Voluntarily introduce foreign bodies by the patient	Oroantral fistula	Nasal obstruction, halitosis, cacosmia, purulent rhinorrhea and post nasal drip	Three years	Left Maxillary sinus	NA	Sinusitis	FESS and Caldwell-Luc procedure	Free of symptoms
14	Dutta et al [24] (2006)	NA	Bullet	NA	Floor of Orbital cavity	Orbital injury, face laceration	Immediate	Right maxillary sinus	NA	NA	Caldwell-Luc procedure	NA
15	Pang et al [25] (2005)	38	Nail	A piece of metal flew into his right cheek	Facial wound	Laceration on the right cheek, facial pain	1 week	Right maxillary sinus ostia	NA	NA	Endoscopy	NA
16	Pathak et al [26] (1999)	NA	Metallic foreign body	Blast injury	Floor of Orbital cavity	Orbital injury	3 weeks	Maxillary sinus	NA	NA	Infraorbital incision-transantral	NA

**Table 1 continued.** Summary of some reported cases of foreign bodies in the maxillary sinus.

Iatrogenic												
#	Author (reference)	Age	Type of FB	Mechanism of injury	Route of entry	Presentation	Time gap between procedure, event and diagnosis	Site of FB	Size	Complications	Management	Outcome
1	Mumtaz et al [32] (2020)	72	Dental implant	During multiple implantations	NA	Right nasal blockage and headache	One year	Right maxillary sinus	NA	Sinusitis	Caldwell-Luc procedure	Free of symptoms
2	Basturk FB et al [16] (2019)	40	Gates-Glidden drill	During endodontic treatment	Perforating the root	Asymptomatic	Immediately	Left maxillary sinus	NA	None	Caldwell-Luc procedure	Free of symptoms
3	Marques FCC et al [30] (2017)	52	Dental tissue	Displacement during dental implant	Floor of maxillary sinus	Asymptomatic	Immediately	Left maxillary sinus, near the distal root of first molar	3x8 mm	None	Caldwell-Luc procedure	No complaints or any episodes of inflammation. Normal maxillary sinus
4	Tanasiewicz M et al [19] (2017)	45	Root canal filling with extrusion of endodontic obturation material	During endodontic treatment	NA	Orbital and buccal pain on the right side of face and headaches	6 months	Right maxillary sinus	NA	NA	open surgical approach?	No clinical symptoms, orbital pain and headaches were eliminated after 6 weeks
5	J. Hajioannou et al [21] (2016)	28	Dental synthetic material	During denervation procedure to the ipsilateral second premolar	Unknown	Left sided sinusitis, not respond to medications	One year	Left maxillary sinus	3 cm	Sinusitis	Caldwell-Luc procedure	Free of symptoms after 6 months of removal
6	Saruhan N et al [14] (2016)	26	Tooth root	Tooth extraction	NA	Pain on the right side of the face	NA	Right maxillary sinus	NA	Sinusitis	MMA	Free of symptoms
7	Deniz Y et al [15] (2016)	63	Dental silicone impression material	NA	Oroantral fistula	Pain during palpation on left maxillary sinus, chronic headaches,	4 years	Left maxillary sinus	NA	Chronic sinusitis	Transnasal endoscopy	NA

**Table 1 continued.** Summary of some reported cases of foreign bodies in the maxillary sinus.

#	Author (reference)	Age	Type of FB	Mechanism of injury	Route of entry	Presentation	Time gap between procedure, event and diagnosis	Site of FB	Size	Complications	Management	Outcome
8	Sireci et al [20] (2015)	77	Dental implant	During dental extraction and implantation	Floor of the left maxillary sinus	Left purulent rhinorrhea and parasthenia in the left maxillary region	3 months	Left maxillary sinus	NA	Left oroantral fistula	Middle meatal antrostomy (MMA)	Free of symptoms
9	Al Nashawany et al [12] (2014)	50	Tooth root	Displacement during tooth extraction	Left maxillary antrum	Nasal regurgitation of fluids and food. Recurrent maxillary sinusitis	Two years	Left maxillary sinusitis	NA	Sinusitis and oroantral fistula	Endonasal endoscopic sinus surgery	NA
10	Sohn et al [13] (2011)	27	Tooth root	Tooth extraction	NA	Asymptomatic.	Immediately	Right maxillary sinus	NA	None	Lateral window approach	NA
11	Sohn et al [13] (2011)	42	Dental implant	During dental implantation	NA	Asymptomatic.	Immediately	Right maxillary sinus	NA	None	Lateral window approach	NA
12	Sohn et al [13] (2011)	27	Tooth root	During tooth extraction	NA	Asymptomatic	Immediately	Right maxillary sinus	NA	None	Lateral window approach	NA
13	Sohn et al [13] (2011)	42	Dental implant	During dental implantation	NA	Asymptomatic	Immediately	Maxillary sinus	NA	NA	Lateral window approach	NA
14	Smith et al [34] (2007)	28	Surgical bur	During tooth extraction	Oroantral fistula	NA	NA	Maxillary sinus	NA	NA	Modified Caldwell-Luc procedure; lat antral wall opened	NA
15	Liston et al [33] (2002)	45	Six gutta percha	During endodontic treatment	Alveolar process of maxillary bone	Asymptomatic	Immediately	Right maxillary sinus		None	Caldwell-Luc procedure	Free of symptoms
16	Friedlich et al [31] (2005)	54	Surgical bur	During teeth removal	NA	Bleeding from a patent oroantral fistula	Immediately	Sphenoid recess of the left maxillary antrum	2 cm	Oroantral fistula	FESS	Free of symptoms

NA – not available; FESS – functional endoscopic sinus surgery; MMA – middle meatal antrostomy.

There are some similar cases in which a metallic foreign body presented in the maxillary sinus [16,17].

Patients with FB in the sinuses can present with mild fever, facial pain, headache, nasal obstruction, and chronic nasal discharge [18]. Some patients have been found to have a FB in the sinuses without any symptoms. However, the FB should be removed to avoid tissue reactions and prevent sinusitis [19].

The mechanism of sinusitis caused by FBs is unknown. It has been suggested that FBs can lead to ciliary insufficiency by causing tissue reaction and producing chronic irritation of the mucosa [19].

In the current case, the patient presented with paresthesia and numbness in the left side of the face. These symptoms could be explained by an injury to the infraorbital nerve through the opening of the infraorbital bone by the FB. Similar studies showed the same presentation in patients with infraorbital nerve injury [20].

In cases of foreign bodies in paranasal sinuses, the definite diagnosis is reached by radiological investigations [20]. Routine radiographs in at least 2 projections, or Waters' radiograph, can usually determine the location and content of radiopacity [21]. The panoramic view is also effective in detecting foreign bodies in maxillary sinus [21]. However, a computed tomography (CT) scan is more accurate than a plain radiograph. CT can assess the shape, size, and exact location of a foreign body as well as capture thin cross-sections and multiple views [20,21]. CT is considered the most beneficial imaging study because of its ability to visualize both bone and soft tissue [21]. CT scanning is essential in planning the surgical approach [20].

Another choice in evaluation of the paranasal sinuses is cone beam computed tomography (CBCT). It has advantages over the other imaging modalities in that there is low radiation exposure while still giving good imaging quality and resolution [22]. However, this imaging modality is not available in our hospital.

In the reported case above, radiological investigations were done after the eye operation, given that the patient had active

severe bleeding and required stabilization. First, we requested plain radiographs. Since they were insufficient, we performed a CT scan to identify the exact location and position of the foreign body, and to better visualize the sinus walls.

Middle meatal antrostomy (MMA) could be considered as one of the choices of FB removal from the maxillary sinus, but it is not the best due to a high failure rate without guarantee of better surgical outcomes [23].

The Caldwell-Luc approach has been used for more than 100 years [12] and is still the mainstay of surgical treatment of maxillary sinus disease after the failure of middle meatal antrostomy [11].

Despite the advanced endoscopic techniques, the Caldwell-Luc procedure remains important for its easier and safer access to the anterior wall and floor of the maxillary sinus compared to the endoscopic procedure and its indications. These indications include the removal of foreign bodies that are impacted in regions not visible or accessible with endoscopic instruments, excision of benign tumors involving the antrum, visualization of orbital floor during orbital floor decompression for Graves ophthalmopathy, access to the pterygomaxillary space, and endoscopic surgical failures [24].

In our case, we decided to perform the Caldwell-Luc procedure because the FB was large in size, impacted in the second premolar region, and the lateral nasal wall was clear without any signs of injury or opening.

## Conclusions

In paranasal sinuses, foreign bodies are rarely encountered. The choice of the surgical approach depends on the location and the size of the foreign body. In this case, the endoscopic approach was not feasible, and the Caldwell-Luc procedure yielded excellent outcomes. The aim of presenting such cases is to give an overview of how to approach a case with an impacted metallic nail in the maxillary sinus, and choose the best way to remove it.



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