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Case Report

Retrobulbar Abscess Following Tooth Infection in a 6-Year-Old Female Patient: A Case Report

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Abstract

Background: Retrobulbar abscess is a rare but potentially life-threatening complication of orbital cellulitis, especially in children; owing to their unique anatomical and immunological characteristics, which increase their susceptibility to such complications, it is usually characterized by proptosis, pain, erythema, and restricted eye movement.

Patient Presentation: This is a case of a 6-year-old girl who presented with a rare retrobulbar abscess due to an odontogenic infection. Symptoms began with toothache, headache, and progressive swelling around the right eye, which persisted despite initial antibiotic therapy. A CT scan revealed a subperiosteal retrobulbar abscess requiring urgent surgical intervention via the modified Lynch approach, followed by odontogenic surgery and antrostomy to extract the infected teeth and remove the antral polyps.

Conclusions: This case demonstrates one of the rare complications of dental infection in a pediatric patient, which highlights the importance of early diagnosis and prompt surgical intervention, as well as comprehensive multidisciplinary care, to prevent irreversible complications such as vision loss in pediatric orbital infections secondary to those of dental origin

Keywords: Retrobulbar Abscess; Orbital Cellulitis; Modified Lynch Approach

Abbreviation

RA: Retrobulbar Abscess

Background

Orbital cellulitis is a serious infection that involves the muscles and fat of the orbit, but it does not involve the globe itself [1].

Retrobulbar abscess (RA) is a rare but serious orbital condition of orbital cellulitis involving the formation of a pus-filled pocket within the retrobulbar space located behind the eye. The orbit is a confined space containing the eye, muscles, nerves, and connective tissues; thus, any increase in pressure, such as that caused by an abscess, can quickly lead to significant complications, including optic nerve compression ending with permanent vision loss [2].

RA in children is particularly concerning because of the unique anatomical and immunological characteristics of these patients, increasing their susceptibility to the rapid spread of infections within the orbit. Understanding this condition in children involves recognizing common causes, clinical presentations, and challenges involved in managing pediatric cases [3].

The clinical signs of RA in children can be subtle early but often progress rapidly. Common symptoms include proptosis, which is usually more noticeable in children owing to their smaller orbits. In addition to pain, children often present with significant pain exacerbated by eye movement, which might become more restricted. The child may resist or be unable to move the affected eye because of pain and mechanical restrictions. Compared with adults,

children might be more irritable and cry persistently. Perior bital swelling and erythema are common and may be tender, and vision can be impaired due to optic nerve compression or corneal exposure from severe proptosis. Additionally, fever and systemic signs are more likely to present in children than in adults [4].

RA frequently arises as a complication of infections in areas surrounding the orbit; sinus infections, especially ethmoid and maxillary sinusitis, constitute the most common source of such complications. Additionally, bacteria can be introduced into the orbit or adjacent facial structures by penetrating trauma. Interestingly, dental infections of the upper teeth, particularly those penetrating deep into the facial planes, are considered rare causes of orbital cellulitis, with only four cases reported in the literature in this regard [5].

Herein, we present a case of a 6-year-old female child who developed RA due to an odontogenic infection.

Case Presentation

A 6-year-old female patient with an unremarkable medical, surgical, and dental history and no known drug allergies was in her usual state of health until four days prior to her presentation to a dentist, when she began experiencing a toothache, headache, and swelling of the right eye, accompanied by a high-grade fever of 40°C, which temporarily improved with antipyretics, including IV paracetamol (acetaminophen) 15 mg/kg.

The patient initially received four doses of Augmentin (amoxicillin/clavulanate potassium) 35 mg/kg prescribed by her primary dentist, but her symptoms persisted. She subsequently developed non-bloody, nonmucoid vomiting twice daily, accompanied by the gradual onset and progressive swelling of her right eye. An ophthalmologist evaluated her and admitted her to the pediatric department, where she received IV Rocephin (ceftriaxone) and IV clindamycin (Cleoin).

However, after three doses, IV clindamycin (Cleoin) was discontinued, and the IV Rocephin (ceftriaxone) dose was increased to a meningeal dose (1150 mg every 12 hours) for a total of four doses. Additionally, IV Flagyl (metronidazole) (300 mg every 8 hours) and IV Vancocin (vancomycin) (340 mg every 6 hours) were initiated. Laboratory tests revealed markedly elevated CRP, ESR, and D-dimer levels, but the coagulation profile was normal (Table 1).

Table 1: Summary of laboratory test results.

Test	Result	Normal Range (unit)
C-Reactive Protein level (CRP)	63	<5.99 mg/L
Erythrocyte Sedimentation Rate (ESR)	100	<24.99 mm/hour
D-Dimer	548	<500 microgram/L
Red Blood Cells (RBC)	4.59	(4.00-5.20)×10^6/mm^3
Hemoglobin (HB)	12.1	(10.3- 14.9) g/dl
White blood Cells (WBC)	12.3	(6.00-15.00)×10^9/mm^3 10
Leukocyte Count	19.7	6-15×10^3/mm^3
Granulocytes Count	7.68	(2.00-7.80)×10^9/mm^3
Lymphocyte count	2.92	(0.60-4.10)×10^9/mm^3
Direct Fluorescent Antibody (DFA)	negative	negative
Urine Routine Ketone	+3	
Prothrombin Time (PT)	14.3	12.00-16.00

During her hospitalization, her clinical condition deteriorated, and she was complicated with diplopia. A follow-up ophthalmologic examination revealed right-sided orbital cellulitis with proptosis and restricted ocular mobility, which obscured the visualization of the right fundus. She remained on previously prescribed IV antibiotics and underwent a computed tomography (CT) scan of the brain and orbits to rule out sinus abscess. This suspicion was ruled out based on the CT findings, and she was subsequently referred to the Oral and Maxillofacial Department for further management after the diagnosis of subperiosteal RA (Figures 1 a, b, c, d, e, f and g).

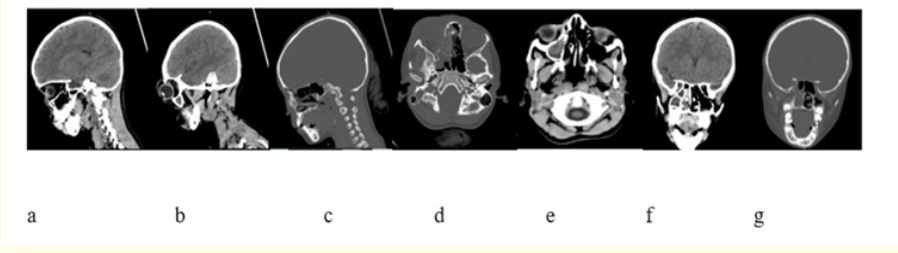

Figure 1

Upon presentation at the oral and maxillofacial department, the patient appeared ill but was fully oriented, without signs of dyspnea, pallor or any systemic symptoms. Her vital signs were stable, and examination of her skin, hair, and nails revealed no abnormalities. Head, eye, ear, nose, and throat (HEENT) examinations revealed significant findings. The patient had marked swelling, tenderness, warmth, and redness of the right eye, with restricted movement and mobility. Despite these findings, her right eye vision remained intact, although she exhibited photophobia. Additionally, there was mild swelling of the left eye, but its movement was preserved. (Figure 2).

Figure 2

Given the clinical and imaging findings, a diagnosis of RA of odontogenic origin was made, and the patient required urgent intervention.

An urgent surgical intervention was planned following the diagnosis of an odontogenic RA, characterized as a subperiosteal orbital abscess. The procedure involved an incision and drainage through the modified Lynch approach and was performed under general anesthesia. A Penrose drain was placed to facilitate ongoing drainage.

During surgery, a moderate amount of yellow pus mixed with blood was evacuated through a stab incision made just below the right eyebrow (Figure 3 a, b, c, and d). The procedure was completed without complications, and the patient was transferred to recover in stable condition. Postoperatively, the patient remained on IV Flagyl (metronidazole) 250 mg and IV Augmentin (amoxicillin/clavulanate potassium) 300 mg for 3 days to manage the infection and prevent recurrence.

Seven days after surgery, the patient underwent right odontogenic surgery via the Caldwell-Luc technique. This procedure in-

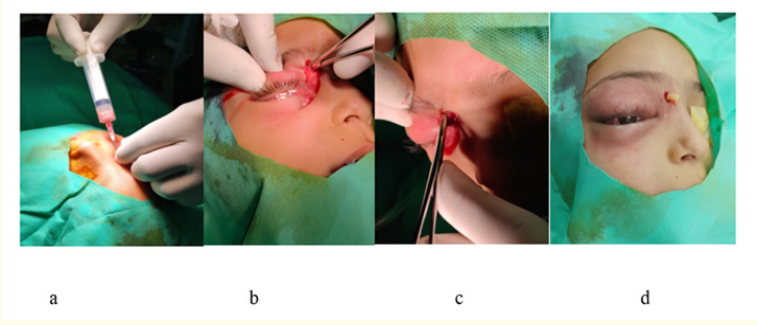

Figure 3

volved the removal of antral polyps and the extraction of the right deciduous first and second molars (54 and 55). Additionally, an antrostomy was performed to clear the sinus opening, ensuring proper drainage. The surgical site was then meticulously sutured in layers. The operation was completed without complications, and the patient was transferred to recover in stable condition (Figures 4 a and b).

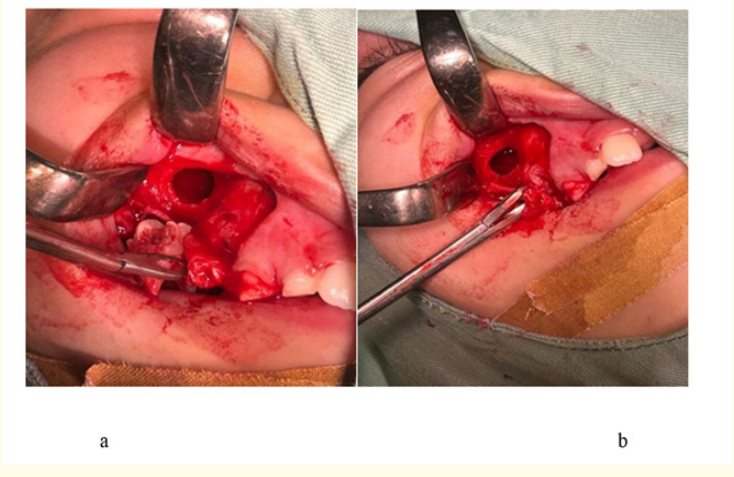

Figure 4

Laboratory results from the initial day of admission through the second surgical intervention demonstrated a progressive decrease in white blood cell count, ESR, and CRP levels. Postoperative follow-up revealed significant clinical improvement, as swelling, edema, proptosis, and redness were markedly reduced. Furthermore, the patient's eye movement and vision normalized (Figure 5a, b and c) (Figure 5d: Picture of the child 8 months after the operation).

Discussion

Orbital cellulitis can be defined as a rare but severe infection affecting the muscle and fat within the orbit but not the globe itself. It can also occur at any age, but it is more common in children [1]. In this age group, the most common predisposing factor for such conditions is upper respiratory tract infection or paranasal sinus infection, especially in the ethmoid or maxillary sinuses, which accounts for more than 90% of all orbital cellulitis cases. The remaining cases are secondary to penetrating trauma or sinus injuries, hematogenous spread from bacteremia and dental infections [4].

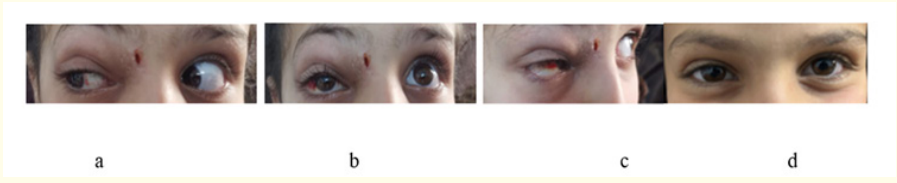

Figure 5

Additionally, orbital infections can be caused by infections from neighboring structures, subacute bacterial endocarditis, or dental infections [6]. The reason behind this is that the infection spreads directly through naturally thin bony dehiscence's and/or, owing to the rapid continuous spread of infection due to the valveless nature of the superior ophthalmic vein and inferior ophthalmic vein, these specific anatomic pathways facilitate the spread of pathogens, highlighting the importance of understanding these anatomical relationships in preventing delayed diagnosis and treatment [2,7,8].

Odontogenic orbital cellulitis represents only 2–5% of cases of orbital cellulitis [9]. Although it is uncommon, it is still considered serious [10]. Dental infections from maxillary teeth extend to orbital spaces and tissues either from maxillary teeth, as occurs in our case, or through other close structures [10].

This emphasizes the importance of early identification, monitoring cases and prescribing proper antibiotic therapy, especially with children, to prevent or stop the spread of such infections. CT is the gold standard imaging modality for orbital cellulitis and abscess diagnosis, as it can be used to determine the extent of abscess from adjacent structures [7]. In this case, a CT scan revealed subperiosteal RA, all along the medial wall of the right orbit, and her ophthalmological examination revealed swelling, proptosis, redness, warmth, tenderness, and limited ocular mobility due to accumulated pus in the right eye and mild swelling in the eyelids of the left eye, which further directed us toward the diagnosis.

The management of these cases, as reported in the literature, includes IV antibiotics with intensive monitoring of systemic and visual functions depending on the severity of the signs, and urgent surgical drainage is also needed in the presence of any subperiosteal abscess. Nevertheless, the use of IV antibiotics and monitoring of cases are currently sufficient, especially in patients with normal visual function [6]. Hence, treatment includes antibiotic therapy, with or without surgery [9]. According to the literature, as subperiosteal RA involves pus accumulation between the orbital bone and periorbita, surgical intervention is needed to relieve intraorbital pressure and avoid serious complications such as blindness, septic cavernous sinus thrombosis, and superior orbital fissure syndrome [9]. Additionally, an appropriate surgical approach based on prompt identification of the odontogenic origin is needed [9].

There are many surgical approaches to the medial orbit for the incision and drainage of subperiosteal abscesses in cases of orbital cellulitis; the transcutaneous-modified Lynch approach to the medial orbit is the safest approach and is superior to the canthal tendon medially and lacrimal apparatus. In the present case, the modified Luych approach was indicated to access the medial orbital wall and extraperiosteal space for the drainage of subperiosteal abscess or bond decompression of the medial orbit. This approach is generally performed between the medial canthus and the nasal dorsum. The lacrimal sac can also be dissected away from its fossa to the level of the nasolacrimal duct. The nasolacrimal duct and trochlea limit exposure inferiorly and superiorly, respectively. This approach is used for extreme orbital swelling and limited visualization. There are other approaches that are deemed to be less superior to our case. This involves the transcaruncular approach, which is performed by first retracting the upper and lower eyelids. Then, the soft tissue surrounding the medial orbit is sharply dissected posteromedially to the posterior lacrimal crest, which can injure the globe, lacrimal apparatus, inferior and superior oblique muscles, and medial canthal tendon. Additionally, the endoscopic endosteal approach is the most suitable approach for accessing the posterior inferomedial orbit and orbital apex without external scarring or injury to the eyelid or associated structures [11]. Therefore, surgical drainage of subperiosteal abscesses was indicated via the modified Lynch approach, and then surgical extraction of the first and second deciduous molars and antrostomy were indicated.

This condition of odontogenic infection is rare and difficult to distinguish, especially in its early stages, and dentists should be aware of it and its complications and be able to prevent or stop it. Additionally, it is important to prevent these infections in children, as they hinder them from engaging in their favorite activities, also causing pain and difficulty in ocular mobility.

In this case, an infection arising from a deciduous tooth gave rise to subperiosteal RA. Dentists should be aware of such rare but severe infections, as well as early signs and symptoms. Early diagnosis is a critical step in preventing or stopping the spread of these infections. These findings emphasize the importance of deciduous tooth care in children. Urgent surgical drainage through the Lynch approach combined with aggressive antibiotic therapy is essential to manage this case, as antibiotics alone cannot eliminate the infection alone. This report highlights the need for multidisciplinary collaboration between general practitioners, oral and maxillofacial surgeons, ENT specialists and ophthalmologists to prevent severe complications in pediatric odontogenic-orbital infections.

Conclusion

In this case report, we observed that dental infections, especially in pediatric patients, could end with RA because of their unique anatomical and immunological characteristics. The authors highlight the need for increased awareness among health care providers regarding the potential complications of dental infections, especially in children, and the need for comprehensive dental care to stop or reduce such complications.

Ethics Approval and Consent to Participate

The study is exempt from ethical approval at our hospital. Verbal informed consent was obtained from the patient for publication of this case report and any accompanying images.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used during the current study are available from the corresponding author upon reasonable request.

Competing Interest

The authors declare that they have no conflicts of interest.

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Authors' Contribution

JA wrote the original draft. SA wrote the original draft. AJ wrote the original draft, administered the project, and reviewed and edited the manuscript. HJ wrote the original draft. JA supervised the project, provided resources, and reviewed and edited the manuscript. All the authors reviewed and approved the final version of the manuscript.

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