International Journal of Health Science (IJHS)

E-ISSN: 2827-9603
P-ISSN: 2827-9603

Research Article

Radiological Evaluation of Dacryocystitis in Children Using CT-Scan

Khairunnisa Sekar Ayu[1*], Yenny R. Mulyanto[2], Ryan Indra[3]

[1,3] Univesity Yarsi, Indonesia
[2] Pasar Rebo Regional General Hospital, Indonesia
* Corresponding Author: E-mail : khairunnisa.sekar81@gmail.com

Abstract: Dacryocystitis is an inflammation of the lacrimal sac resulting from nasolacrimal duct obstruction, which interferes with tear drainage and leads to secondary infection. It commonly occurs in children and individuals over 40 years old, characterized by pain, redness, and swelling in the medial canthus area. This study aims to evaluate radiological findings of dacryocystitis in a child using Computed Tomography (CT) Scan as the main diagnostic modality. The descriptive case study involved a six-year-old girl with right eye pain and swelling for seven days before hospitalization. Physical examination revealed swelling, hyperemia, and tenderness in the right lower eyelid. Orbital CT-scan showed a hypodense lesion in the right inferior orbital region extending to the inferior canaliculus and proximal lacrimal sac, with periorbital swelling confirming dacryocystitis. Follow-up imaging demonstrated lesion enlargement, indicating progressive inflammation. The patient received antibiotic and supportive therapy, leading to clinical improvement after treatment. CT-scan examination proved essential in confirming diagnosis, assessing inflammation severity, and guiding appropriate treatment planning.

Keywords: CT-Scan; Dacryocystitis; Nasolacrimal Obstruction; Pediatric Ophthalmology; Radiology

1. Introduction

The nasolacrimal duct, approximately 18 mm in length, connects the distal part of the lacrimal sac with the inferior nasal meatus, playing a crucial role in draining tears from the eye into the nasal cavity. However, this structure is prone to obstruction due to congenital or acquired factors, leading to impaired tear drainage and secondary infection known as dacryocystitis an inflammation of the lacrimal drainage system marked by swelling, pain, and epiphora (Ali & Javed, 2020; Nurladira, 2021).

Dacryocystitis is one of the most common complications of nasolacrimal duct obstruction, typically occurring in children and adults over 40 years of age, especially women, due to narrower duct anatomy compared to men (Shrestha et al., 2019). The accumulation of tears along with epithelial debris and mucus within the sac creates a moist environment favorable for pathogenic bacterial growth such as *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Haemophilus influenzae* (Mishra et al., 2021). Consequently, patients often experience tenderness, redness in the medial canthus, and sometimes purulent discharge from the lacrimal punctum.

Epidemiologically, dacryocystitis exhibits a bimodal age distribution, peaking in infancy (congenital cases) and adulthood, particularly among women over 40 years old (Ooi et al., 2020). Although clinical diagnosis can generally be made through physical examination, radiological imaging plays an important role in determining the location and degree of

Received: September 16, 2025
Revised: October 30, 2025
Accepted: November 13, 2025
Online Available: December 01, 2025
Curr. Ver.: December 01, 2025

obstruction, evaluating adjacent structures, and detecting complications such as abscess formation or extension of infection into paranasal sinuses (Fayers et al., 2018).

Imaging modalities such as Computed Tomography (CT) provide detailed visualization of the lacrimal drainage system and surrounding anatomy. Asheim & Spickler (2005) reported that CT can identify structural abnormalities such as congenital dacryocystocele, lacrimal sac diverticulum, and nasolacrimal duct dysplasia in pediatric patients with recurrent dacryocystitis. Zhang et al. (2019) also confirmed that CT effectively detects foreign bodies or calcifications (dacryolithiasis) within the lacrimal sac, which are often responsible for chronic obstruction. Such imaging findings assist physicians in selecting the most suitable therapeutic approach, whether conservative or surgical.

Nevertheless, most previous studies have focused on congenital and pediatric cases, while radiological evaluations of anatomical patterns in adults with primary dacryocystitis remain limited (Pradhan et al., 2022). This limitation underscores a significant research gap that can be addressed through radiological studies in adult populations to better understand the complex anatomical variations and etiologies of nasolacrimal duct obstruction.

Based on this background, the present study aims to analyze radiological findings in dacryocystitis patients using Computed Tomography (CT) to identify anatomical patterns, obstruction sites, and underlying structural causes. The findings are expected to contribute to improving diagnostic accuracy and optimizing management planning for nasolacrimal duct obstruction cases.

2. Literature Review

Anatomy of the Lacrimal System

The lacrimal system functions to drain tears from the eye into the nasal cavity, maintaining ocular surface moisture and cleanliness. The flow begins at the lacrimal puncta small openings located medially on the upper and lower eyelids. These puncta lead into the lacrimal canaliculi, which converge into a common canaliculus that empties into the lacrimal sac. The lacrimal sac serves as a temporary reservoir for tears before they pass through the nasolacrimal duct and drain into the inferior nasal meatus within the nasal cavity (Algifari et al., 2023). Tear movement is influenced by intraluminal pressure changes during blinking. The alternating contraction and relaxation of the orbicularis oculi muscle create a pumping mechanism that promotes efficient tear drainage (Nurladira, 2021; Singh & Ali, 2022). Anatomical asymmetry exists between the right and left sides, where the angle between the nasolacrimal duct and lacrimal fossa tends to be wider on the right, which may explain why dacryocystitis occurs more frequently in the right eye. At the junction between the lacrimal sac and the common canaliculus lies the Rosenmüller valve, while at the distal end of the nasolacrimal duct and nasal mucosa lies the Hasner valve, preventing tear reflux from the nasal cavity.

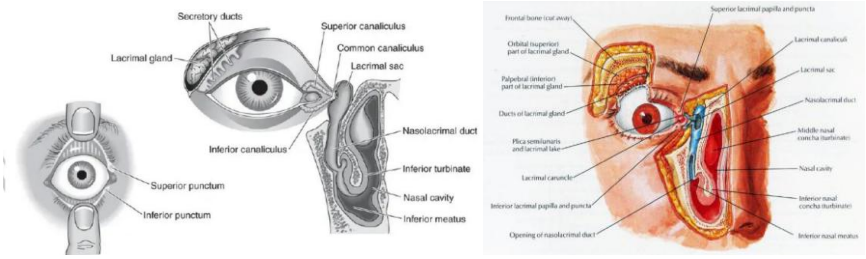

Figure 1. Anatomy of the Lacrimal System

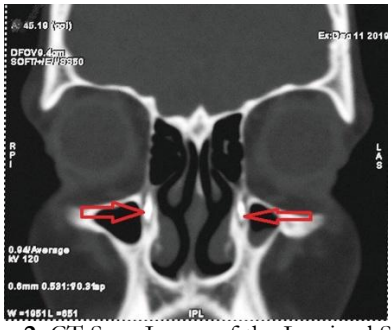

Figure 2. CT Scan Image of the Lacrimal System

Definition

Dacryocystitis is an inflammation or infection of the lacrimal sac resulting from obstruction of the nasolacrimal duct, leading to tear stagnation and the proliferation of pathogenic microorganisms. Clinically, dacryocystitis is classified into two forms: acute and chronic. Acute dacryocystitis presents with rapid onset, pain, redness, and swelling in the medial canthal area, whereas chronic dacryocystitis is characterized by persistent epiphora, mucoid or mucopurulent discharge, and mild irritation (Fatima et al., 2023; Venkatesh & Shanker, 2024). In acute cases, abscess formation may occur, potentially leading to rupture through the skin or the development of a fistula if untreated. Chronic dacryocystitis, on the other hand, often arises from long-standing nasolacrimal duct obstruction and may be associated with recurrent episodes of acute infection. The most common causative organisms include *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Pseudomonas aeruginosa*, although the bacterial spectrum can vary depending on geographical and demographic factors (Kumar et al., 2023).

The diagnosis of dacryocystitis is primarily clinical, based on characteristic symptoms and signs, but imaging modalities such as dacryocystography or CT dacryoscans may be used to assess the extent of obstruction or rule out other pathologies. Treatment aims to relieve obstruction, eradicate infection, and restore normal tear drainage. In acute cases, systemic antibiotics and warm compresses are indicated, followed by definitive surgical management once inflammation subsides. Chronic dacryocystitis typically requires dacryocystorhinostomy (DCR), a procedure that creates a new drainage pathway between the lacrimal sac and the nasal cavity. Early recognition and appropriate management are crucial to prevent complications such as orbital cellulitis, abscess formation, or sepsis, which may threaten both vision and life (Bhanwala, 2024).

Epidemiology

Dacryocystitis shows a bimodal age distribution, occurring frequently in newborns (congenital cases) and adults over 40 years old. It is more common in females due to their relatively narrower nasolacrimal ducts compared to males. Population-based studies report that more than 75% of cases occur in women, with a higher prevalence among individuals of Caucasian descent (Bhanwala, 2024). In congenital dacryocystitis, the condition is usually caused by failure of canalization at the valve of Hasner, which results in nasolacrimal duct obstruction soon after birth. Most infants present with tearing and discharge within the first few weeks of life, although spontaneous resolution often occurs with conservative treatment such as lacrimal sac massage (Crigler's technique) and topical antibiotics (Venkatesh & Shanker, 2024).

In adults, acquired nasolacrimal duct obstruction is typically idiopathic but may also result from chronic inflammation, trauma, nasal or sinus disease, or systemic conditions such as sarcoidosis or Wegener's granulomatosis. The prevalence tends to increase with age due to age-related narrowing of the duct and mucosal atrophy. Epidemiological studies indicate that environmental factors, poor hygiene, and chronic sinus infections contribute to higher rates in developing countries. Moreover, seasonal variations have been observed, with higher

incidences during colder months, possibly related to upper respiratory tract infections. Understanding the epidemiological pattern of dacryocystitis is essential for implementing preventive measures, improving early detection, and optimizing management strategies across different populations (Fatima et al., 2023).

Classification

Dacryocystitis can be classified based on duration and etiology into four main types: acute, chronic, congenital, and acquired. Acute dacryocystitis manifests suddenly with local inflammatory symptoms such as pain, redness, swelling, and sometimes abscess formation. Chronic dacryocystitis develops gradually, showing persistent epiphora, mucopurulent discharge, and mild irritation without marked acute inflammation. Congenital dacryocystitis typically affects infants due to developmental abnormalities, such as failure of the Hasner valve to open or incomplete canalization of the nasolacrimal duct. In contrast, acquired dacryocystitis occurs after birth and may present as either an acute or chronic condition, depending on the severity and duration of inflammation.

From an etiological perspective, acquired dacryocystitis is further divided into Primary Acquired Nasolacrimal Duct Obstruction (PANDO) and Secondary Acquired Nasolacrimal Duct Obstruction (SANDO). PANDO occurs idiopathically without a clear underlying cause, whereas SANDO results from identifiable factors such as trauma, tumors, infections, medications, or anatomical abnormalities. These distinctions are essential for accurate diagnosis and treatment planning, as each type may require different clinical approaches and interventions (Eshraghi et al., 2014; Khatoon et al., 2021; Luo et al., 2021).

Pathogenesis

The pathogenesis of dacryocystitis begins with obstruction of the nasolacrimal duct, which normally channels tears from the lacrimal sac to the nasal cavity. The blockage causes tear stasis, resulting in the accumulation of fluid, desquamated epithelial cells, and mucus secretion, creating a moist and warm environment that supports bacterial growth (Dahlan et al., 2017). The ensuing infection triggers inflammation of the lacrimal sac, leading to pain, redness, and swelling in the anteromedial orbital area. Recurrent inflammation can cause dilatation of the lacrimal sac and mucosal remodeling, further impairing tear flow and perpetuating chronic infection (Nurladira, 2021).

At the cellular level, obstruction and stagnation of tears induce a local inflammatory response characterized by infiltration of neutrophils, lymphocytes, and macrophages into the lacrimal sac wall. These immune cells release cytokines and proteolytic enzymes, contributing to tissue edema and epithelial damage. The damaged mucosa loses its barrier function, allowing bacteria such as *Staphylococcus aureus*, *Streptococcus pneumoniae*, or *Haemophilus influenzae* to adhere, colonize, and form biofilms that protect them from host defenses and antibiotic therapy. Over time, chronic inflammation leads to fibrosis, thickening of the sac wall, and permanent narrowing of the nasolacrimal duct, establishing a cycle of obstruction and reinfection (Fatima et al., 2023; Kumar et al., 2023).

In advanced or untreated cases, the infection may extend beyond the confines of the lacrimal sac, spreading to adjacent soft tissues and causing preseptal or orbital cellulitis. Rarely, it can progress to abscess formation or even systemic complications such as septicemia. In congenital dacryocystitis, the pathogenesis often involves the persistence of an epithelial membrane at the valve of Hasner, which prevents tear drainage into the nasal cavity. The retained tears serve as a medium for microbial growth soon after birth, resulting in inflammation and discharge. Understanding the pathophysiological mechanisms of dacryocystitis is crucial for determining appropriate management strategies, including both antimicrobial therapy and surgical intervention to restore normal lacrimal drainage and prevent recurrence (Bhanwala, 2024; Venkatesh & Shanker, 2024).

Clinical Manifestations

In infants, dacryocystitis usually presents within the first few weeks of life and is commonly caused by congenital obstruction at the valve of Hasner. The main symptoms include persistent tearing, mucopurulent discharge near the medial canthus, and redness or swelling of the lower eyelid. On gentle pressure over the lacrimal sac, pus or mucus may reflux through the punctum. In severe cases, the infection can spread to surrounding tissues, leading to cellulitis or abscess formation. Early diagnosis and treatment are essential to prevent complications and to ensure normal tear drainage development (Sundari & Kontraiandi, 2020).

In children and adults, acute dacryocystitis typically presents with sudden onset of pain, tenderness, and swelling in the medial canthal region. The overlying skin appears erythematous, warm, and edematous, and patients may experience fever, malaise, and purulent discharge. The swelling may become fluctuant, indicating abscess formation, and spontaneous rupture can result in pus drainage through the skin or formation of a chronic fistula. If left untreated, the infection may extend to adjacent tissues, causing preseptal or orbital cellulitis, which can threaten vision and require urgent intervention (Algifari et al., 2023).

Chronic dacryocystitis, in contrast, presents with long-standing tearing (epiphora) and intermittent mucoid or mucopurulent discharge without significant pain or redness. The swelling around the medial canthus is usually mild and non-tender, but gentle pressure over the sac can elicit discharge through the punctum. Symptoms often worsen with exposure to cold air, dust, or smoke. Prolonged inflammation may cause fibrosis, atrophy, and loss of tone in the sac wall, resulting in persistent obstruction. In such cases, surgical treatment such as dacryocystorhinostomy (DCR) is often required to restore proper tear drainage and prevent recurrent infection.

Diagnosis

Diagnosis of dacryocystitis is established through careful history taking, thorough physical examination, and supporting diagnostic tests. The patient's history provides important clues regarding the onset, duration, and progression of symptoms such as tearing, discharge, and pain near the medial canthus. Physical examination typically reveals swelling, redness, and tenderness over the lacrimal sac area, with purulent or mucoid discharge expressed upon gentle pressure over the sac. In chronic cases, the swelling tends to be non-tender with persistent tearing and intermittent discharge. Several simple diagnostic procedures may be performed, such as the fluorescein dye disappearance test (FDDT) to evaluate tear drainage efficiency, syringing and probing to determine the site of obstruction, and microbiological culture of the discharge to identify causative pathogens and guide antibiotic therapy. Differential diagnoses such as conjunctivitis, preseptal cellulitis, and orbital abscess should also be considered and ruled out through clinical and imaging assessment (Fatima et al., 2023; Kumar et al., 2023).

Radiological imaging plays a crucial role in confirming the diagnosis and assessing the extent of the disease. Computed Tomography (CT) is particularly useful for identifying the exact site of nasolacrimal duct obstruction, evaluating the degree of inflammation, and detecting complications such as abscess formation or sinus involvement. Non-contrast CT typically shows a hypodense lesion in the lacrimal sac region, while contrast-enhanced CT demonstrates sac wall enhancement and perilesional changes. High-resolution axial and coronal CT scans provide detailed visualization of the lacrimal sac and surrounding structures, aiding in the detection of bony erosion or orbital extension. The combination of CT with dacryocystography (CT-DCG) further enhances the visualization of the lacrimal drainage anatomy and obstruction level. In selected cases, magnetic resonance imaging (MRI) may be indicated to evaluate soft tissue involvement and differentiate dacryocystitis from other

orbital or sinonasal pathologies. Together, these diagnostic approaches ensure accurate assessment and guide appropriate medical or surgical management of dacryocystitis (Asheim & Spickler, 2005; Raslan et al., 2019).

Management

The management of dacryocystitis involves three main approaches: conservative, pharmacological, and surgical. Conservative and pharmacological management focuses on alleviating symptoms and preventing the progression of infection. Warm compresses applied three times daily help facilitate tear drainage, while analgesics are used to relieve pain. To control bacterial infection, topical or oral antibiotics such as 0.8% chloramphenicol are commonly prescribed. In more severe cases, intravenous antibiotic therapy such as cefazolin (3 × 1 g) or cefuroxime (3 × 1.5 g) may be required, with dosage adjustments based on patient age and clinical severity.

Surgical intervention is indicated to reestablish normal tear drainage and reduce the risk of recurrence. The standard surgical procedure is Dacryocystorhinostomy (DCR), which involves creating a new passage between the lacrimal sac and the nasal cavity to bypass the obstructed nasolacrimal duct. This procedure can be performed through an external approach or endonasally using an endoscope. Among the two, Endoscopic DCR (EN-DCR) has shown a higher success rate of approximately 84%, compared to External DCR (EXT-DCR) at around 70%, and is preferred for its superior functional and cosmetic results (Rajabi et al., 2022; Somuk et al., 2016).

Prognosis

The prognosis of dacryocystitis is generally favorable when diagnosis and treatment are carried out promptly. The Dacryocystorhinostomy (DCR) procedure, either through external or endoscopic approaches, effectively restores tear drainage and prevents recurrent infections by creating a new passage between the lacrimal sac and nasal cavity. With appropriate antibiotic therapy and timely surgical intervention, most patients experience significant clinical improvement, resolution of symptoms, and a low risk of long-term recurrence (Algifari et al., 2023). However, delayed diagnosis or inadequate management can lead to chronic infection, fibrosis, and complications such as fistula formation, orbital cellulitis, or even systemic sepsis. Therefore, early detection and individualized treatment planning remain essential to achieving optimal outcomes (Algifari et al., 2023).

Recent studies have expanded the understanding of dacryocystitis prognosis through the integration of novel diagnostic tools, surgical innovations, and microbiological analyses. Fatima et al. (2023) demonstrated that early imaging evaluation using CT-Dacryocystography (CT-DCG) significantly improves surgical planning by accurately identifying obstruction sites, thereby enhancing postoperative success rates. Similarly, Kumar et al. (2023) reported that the use of minimally invasive endoscopic DCR has comparable efficacy to external DCR, with added advantages of reduced scarring and shorter recovery times. Other studies, such as those by Bhanwala (2024) and Venkatesh & Shanker (2024), highlighted the importance of microbial profiling in guiding antibiotic therapy, noting an increasing prevalence of resistant bacterial strains that may influence treatment outcomes. Despite these advancements, variations in success rates still exist due to factors such as patient age, chronicity of infection, anatomical differences, and postoperative care adherence.

The state-of-the-art management of dacryocystitis now emphasizes a multidisciplinary approach integrating advanced imaging, microbiological testing, and tailored surgical techniques to optimize patient prognosis. Theoretical perspectives also highlight the importance of understanding nasolacrimal anatomy, mucosal healing processes, and the role of biofilm formation in recurrent infections. Compared to previous research that primarily focused on surgical outcomes, current studies increasingly explore preventive strategies and minimally invasive interventions, such as balloon dacryoplasty and laser-assisted DCR, as

viable alternatives for select cases. Thus, while the overall prognosis remains good with proper management, continued innovation in diagnostic precision and surgical techniques holds promise for improving long-term success and patient quality of life (Fatima et al., 2023; Kumar et al., 2023; Bhanwala, 2024).

3. Materials and Method

This study employed a descriptive case study method aimed at providing a detailed overview of the clinical presentation and radiological findings in a patient diagnosed with dacryocystitis. The research was conducted from May to July 2025, beginning with the patient's initial orbital CT-scan examination and continuing through the follow-up evaluation after treatment. The case involved a six-year-old girl presenting with pain and swelling in the right eye. Data collected included results from medical history (anamnesis), physical examination, laboratory investigations, and radiological assessments using orbital CT-scan with and without contrast enhancement. All data were obtained from the patient's clinical and radiological evaluations, then analyzed and presented descriptively to assess the radiological characteristics of dacryocystitis and their correlation with the patient's clinical manifestations. The analysis results are presented in narrative form and supported by image documentation to provide a comprehensive understanding of the role of radiological examination in establishing the diagnosis of dacryocystitis.

4. Results and Discussion

Case

A six-year-old girl, identified as K., presented with pain and swelling in the right eye that had persisted for seven days prior to hospital admission. Initially, the patient experienced right eye pain that worsened at night and was followed by progressive swelling. The next morning, she was taken to an eye clinic and received topical and oral antibiotic treatment. However, after three to four days of therapy, there was no improvement; instead, the symptoms worsened with the onset of fever (±38°C) and purulent discharge from the swollen area. The patient also complained of itching and mild discomfort in the right eye but denied nausea, vomiting, cough, or cold. According to her mother, she had experienced recurrent episodes of eye discharge since infancy, suggesting a possible congenital nasolacrimal duct obstruction that had gone untreated. The patient was born via cesarean section due to breech presentation, with a birth weight of 2700 g and a length of 45 cm. Immunizations were complete according to the national schedule. She had a history of hospitalization at four months old due to fever but no history of seizures, asthma, allergies, or tuberculosis. Family history was unremarkable for similar eye conditions or systemic diseases.

On physical examination, the patient appeared mildly ill but was fully conscious and cooperative (E4V5M6). Vital signs were stable, with blood pressure 105/80 mmHg, pulse rate 113 bpm, respiratory rate 22/min, body temperature 36.8°C, and oxygen saturation 99% on room air. Her height was 110 cm, and weight 18 kg, resulting in a body mass index of 14.9 kg/m², within the normal range for age. Ophthalmologic examination showed normal visual acuity (6/6) in both eyes, intact ocular motility, and orthophoria alignment, indicating the absence of extraocular muscle or orbital involvement. The intraocular pressure was not assessed due to patient discomfort. Inspection revealed a localized swelling on the right lower eyelid, extending toward the medial canthus, with overlying erythema, warmth, and tenderness upon palpation. The superciliary region and the tarsal and bulbar conjunctiva were unremarkable, while the lower punctum exhibited mild discharge upon compression of the lacrimal sac area. The cornea, anterior chamber, iris, pupil, lens, and fundus appeared normal, excluding intraocular pathology.

Based on the clinical presentation and findings, the patient was suspected of having acute dacryocystitis secondary to congenital nasolacrimal duct obstruction. The presence of tenderness, erythema, and purulent discharge localized to the lacrimal sac region strongly supported the diagnosis. Laboratory investigations, including a complete blood count, were recommended to assess for infection, while imaging studies such as computed tomography (CT) or dacryocystography could be used to evaluate the extent of obstruction and possible abscess formation. The patient was advised to discontinue the previous topical antibiotics and begin systemic antibiotic therapy targeting common pathogens such as *Staphylococcus aureus* and *Streptococcus pneumoniae*. Warm compresses were also recommended to reduce inflammation and facilitate drainage. Surgical intervention, such as probing of the nasolacrimal duct or dacryocystorhinostomy (DCR), would be considered if conservative management failed or if recurrent infections persisted after resolution of the acute episode.

Figure 3. Clinical presentation of patient K.

Laboratory testing conducted on May 21, 2025, revealed a markedly elevated erythrocyte sedimentation rate (ESR) of 46 mm/hour, indicating a significant inflammatory response. This laboratory finding supported the clinical suspicion of an active infectious process. Subsequently, a contrast-enhanced orbital CT scan performed on May 22, 2025, demonstrated a well-defined hypodense lesion with irregular borders and rim enhancement after contrast administration. The lesion, measuring approximately 1.3 × 1.4 × 1.6 cm, was localized in the inferior right orbit and extended toward the inferior canaliculus and proximal lacrimal sac. These radiological features were consistent with a localized abscess formation secondary to acute dacryocystitis. In addition, the CT scan showed associated periorbital swelling and mucosal thickening of the maxillary, ethmoidal, and bilateral frontal sinuses, suggesting concurrent sinusitis that may have contributed to or exacerbated the orbital infection.

During hospitalization, the patient received a comprehensive regimen of systemic and topical antimicrobial therapy aimed at controlling the infection and reducing inflammation. The prescribed medications included Cendo Gentamicin 3.5 g (three times daily), Ofloxacin eye drops administered every hour, Ceftriaxone injection 900 mg once daily, Paracetamol injection 200 mg three times daily for pain and fever management, and Dexamethasone injection 2 mg three times daily to reduce inflammation and tissue swelling. Over the course of treatment, the patient's symptoms gradually improved—pain and tenderness subsided significantly, and systemic signs of infection such as fever resolved. However, mild swelling and erythema of the right lower eyelid persisted, indicating the need for continued observation and possible surgical intervention to prevent chronic obstruction or recurrent infection of the lacrimal drainage system.

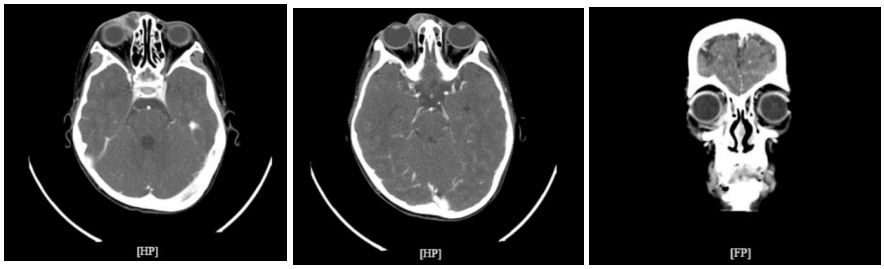

Figure 4. Contrast orbital CT scan of patient K.

On July 23, 2025, the patient returned for a follow-up visit with complaints that mirrored her previous episode, including recurrent swelling, redness, and mild discomfort in the right lower eyelid and medial canthus region. Despite previous improvement following antibiotic therapy, the recurrence of symptoms suggested incomplete resolution of the infection or persistent obstruction of the nasolacrimal drainage system. A non-contrast orbital CT scan performed on July 24, 2025, revealed a well-defined, inhomogeneous hypodense lesion with irregular margins measuring 2.5 × 1.75 × 2.16 cm in the right medial canthus area. Additionally, a hypodense lesion was noted within the right nasolacrimal duct, signifying blockage of the tear drainage pathway. These radiological findings were consistent with a diagnosis of recurrent dacryocystitis complicated by nasolacrimal duct obstruction, which can often lead to chronic infection and inflammation of the lacrimal sac if not properly managed.

Given the persistence of symptoms and imaging results, the patient was prescribed a revised therapeutic regimen targeting both infection control and inflammation reduction. The treatment included Clindamycin 150 mg three times daily as a broad-spectrum antibiotic effective against Gram-positive and anaerobic bacteria commonly implicated in dacryocystitis. Methylprednisolone 4 mg three times daily was administered to reduce periorbital inflammation and swelling, while Cendo Xitrol eye ointment (a combination of antibiotic and corticosteroid) was applied three times daily to provide localized antimicrobial and anti-inflammatory effects. Additionally, Levofloxacin eye drops 0.6 ml were given hourly to maintain continuous antibacterial coverage at the ocular surface. The patient was advised to maintain strict medication adherence and hygiene around the affected area. Follow-up evaluation was planned to monitor treatment response and to consider surgical intervention, such as dacryocystorhinostomy (DCR), if medical therapy failed to achieve complete resolution or if recurrent obstruction persisted.

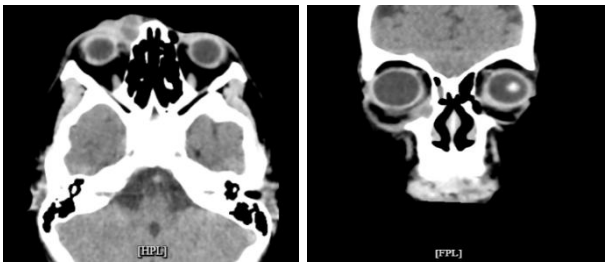

Figure 5. Non-contrast orbital CT scan of patient K.

Case Discussion

Dacryocystitis is an infection or inflammation of the lacrimal sac that most commonly arises from obstruction of the nasolacrimal duct, resulting in stagnation of tears and subsequent bacterial proliferation within the lacrimal drainage system. The condition can manifest as either acute or chronic, depending on the duration of symptoms and the degree of obstruction and inflammation. In acute cases, bacterial pathogens such as *Staphylococcus aureus*, *Streptococcus pneumoniae*, or *Haemophilus influenzae* are frequently identified, whereas chronic cases often involve mixed flora and persistent low-grade infection (Fatima et al., 2023; Nurladira, 2021). The inflammation leads to distention of the lacrimal sac, epithelial damage,

and in severe instances, abscess formation. If untreated, dacryocystitis may progress to periorbital cellulitis or orbital abscess, underscoring the importance of timely diagnosis and intervention.

In this case, the patient was a six-year-old girl presenting with right eye pain, swelling, and redness persisting for seven days prior to hospital admission. Despite receiving oral and topical antibiotics from a private clinic, her symptoms worsened, with the addition of fever (±38°C), purulent discharge, and itching. These signs align with the classical clinical picture of acute dacryocystitis, which typically manifests with sudden pain, erythema, and indurated swelling near the medial canthus (Venkatesh & Shanker, 2024). A contrast-enhanced CT scan performed on May 22, 2025, revealed a sharply defined, irregular hypodense lesion with rim enhancement measuring 1.3 × 1.4 × 1.6 cm in the inferior right orbit, involving the inferior canaliculus and proximal lacrimal sac, accompanied by periorbital swelling and mucosal thickening of the maxillary and frontal sinuses. These radiological findings are consistent with an active inflammatory process, suggesting localized abscess formation. Following systemic and topical antibiotic, corticosteroid, and antipyretic therapy, the patient showed partial improvement, though not complete resolution.

A follow-up non-contrast CT scan on July 24, 2025, revealed an inhomogeneous hypodense lesion with irregular margins measuring 2.5 × 1.75 × 2.16 cm at the right medial canthus, along with a hypodense lesion filling the nasolacrimal duct. Compared with the initial imaging, this represented a significant increase in size, indicating ongoing or recurrent inflammation and abscess progression. Such findings are indicative of chronic dacryocystitis complicated by complete nasolacrimal duct obstruction. This aligns with observations by Zhang et al. (2019), who noted that rim-enhancing hypodense lesions on CT typically represent active infection or abscess formation within the lacrimal sac or adjacent structures. Similarly, Raslan et al. (2019) highlighted the diagnostic value of CT and CT-Dacryocystography (CT-DCG) in determining obstruction levels and differentiating between acute and chronic dacryocystitis. The recurrent nature of infection in this pediatric patient supports the assertion by Pradhan et al. (2022), that children are anatomically predisposed to nasolacrimal obstruction due to narrower ductal pathways, increasing their susceptibility to recurrent infections and periorbital extension if inadequately treated.

Therapeutically, the administration of Clindamycin and Levofloxacin was appropriate, given their effectiveness against both aerobic and anaerobic organisms commonly implicated in chronic dacryocystitis (Mishra et al., 2021). However, the persistence and enlargement of the lesion despite multiple courses of antibiotics indicate that pharmacologic therapy alone was insufficient to achieve definitive resolution. Consequently, surgical intervention such as Dacryocystorhinostomy (DCR) becomes necessary to re-establish proper tear drainage and prevent further recurrence. This case underscores the crucial role of radiological evaluation particularly CT imaging not only in confirming the diagnosis but also in assessing disease progression, guiding therapeutic decisions, and planning surgical management. Comprehensive imaging helps clinicians identify the extent of inflammation, detect potential complications, and implement early, targeted interventions to ensure optimal outcomes in pediatric dacryocystitis cases.

6. Conclusion

This study demonstrates that CT scan examination has a high diagnostic value in detecting the location, extent, and degree of obstruction in the lacrimal system in pediatric dacryocystitis cases. Radiological findings, such as a hypodense lesion with rim enhancement and extension into the nasolacrimal duct, confirm the presence of an active inflammatory process and total obstruction consistent with the clinical manifestations. CT scan examination also plays an important role in determining management strategies, both conservative and

surgical. Therefore, it is recommended that CT scans be utilized in pediatric patients with recurrent symptoms or those who do not show improvement after conservative therapy, to prevent further complications and assist in planning surgical procedures such as Dacryocystorhinostomy (DCR).

Acknowledgment

The author would like to express sincere gratitude to the Department of Radiology, Faculty of Medicine, Yarsi University, for their support, facilities, and guidance throughout the implementation of this study. I would also like to extend my deepest appreciation to my supervisor for all the guidance, direction, and support provided during the research process. Special thanks are also extended to the institution and the teaching hospital for providing the necessary facilities and granting permission to use patient radiological data and documentation, which made it possible to complete this study successfully.

References

Algifari, M. Z., Sangging, P. R. A., & Himayani, R. (2023). Dakriosistitis. *Medula, 13*(4.1), 202–206.

Ali, M. J., & Javed, A. (2020). Dacryocystitis: Clinical features, microbiology, and management approaches. *Indian Journal of Ophthalmology, 68*(12), 2651–2659. https://doi.org/10.4103/ijo.IJO_2020_1340

Asheim, J., & Spickler, E. (2005). CT demonstration of dacryolithiasis complicated by dacryocystitis. *American Journal of Neuroradiology, 26*(10), 2640–2641.

Bhanwala, S. (2024). Dacryocystitis and its management. In *Rhinology Conditions – Contemporary Topics*. IntechOpen. https://doi.org/10.5772/intechopen.1005585

Dahlan, M. R., Boesoirie, K., Kartiwa, A., Boesoirie, S. F., & Puspitasari, H. (2017). Karakteristik penderita dakriosistitis di Pusat Mata Nasional Rumah Sakit Mata Cicendo. *Majalah Kedokteran Bandung, 49*(4), 281–286.

Eshraghi, B., Abdi, P., Akbari, M., & Fard, M. A. (2014). Microbiologic spectrum of acute and chronic dacryocystitis. *International Journal of Ophthalmology, 7*(5), 864–867.

Fatima, K., Chowdary, S., Eram, S., Fatima, S. W., & Khan, S. A. (2023). Clinico-microbiological profile in dacryocystitis at a tertiary care teaching hospital. *Research Journal of Medical Sciences, 17*(7), 991–995.

Fayers, T., Dolman, P. J., & Rootman, J. (2018). Imaging of the lacrimal drainage system in acquired nasolacrimal duct obstruction. *Survey of Ophthalmology, 63*(5), 695–708. https://doi.org/10.1016/j.survophthal.2018.01.002

Khatoon, J., Rizvi, S. A. R., Gupta, Y., & Alam, M. S. (2021). A prospective study on epidemiology of dacryocystitis at a tertiary eye care center in Northern India. *Oman Journal of Ophthalmology, 14*(3), 169–172. https://doi.org/10.4103/ojo.ojo_80_21

Kumar, P., Singh, R., & Mehta, S. (2023). Clinical spectrum and management of dacryocystitis: A radiological and surgical perspective. *Journal of Ophthalmic Inflammation and Infection, 13*(2), 115–123. https://doi.org/10.1007/s12348-023-00345-7

Luo, B., Li, M., Xiang, N., Hu, W., Liu, R., & Yan, X. (2021). The microbiologic spectrum of dacryocystitis. *BMC Ophthalmology, 21*(1), 29. https://doi.org/10.1186/s12886-020-01792-4

Mishra, P., Singh, S., & Gupta, R. (2021). Bacteriological profile and antibiotic sensitivity pattern in chronic dacryocystitis patients. *International Journal of Ocular and Oculoplastic Surgery, 7*(3), 112–117. https://doi.org/10.18231/j.ijooo.2021.027

Nurladira, S. T. (2021). Manajemen dakriosistitis. *Jurnal Medika Hutama, 3*(1), 1468–1474.

Ooi, E. H., Wormald, P. J., & Tan, L. W. (2020). Lacrimal sac and nasolacrimal duct diseases: Clinical and radiologic perspectives. *Ophthalmic Plastic and Reconstructive Surgery, 36*(4), 345–352. https://doi.org/10.1097/IOP.0000000000001551

Pradhan, R., Ghimire, N., Shrestha, B. L., & Karki, D. B. (2022). Computed tomography evaluation of nasolacrimal duct anatomy and its variations in primary acquired nasolacrimal duct obstruction (PANDO). *Clinical Ophthalmology, 16*, 1529–1537. https://doi.org/10.2147/OPTH.S351960

Rajabi, M. T., Shahraki, K., Nozare, A., Moravej, Z., Tavakolizadeh, S., Salim, R. E., Hosseinzadeh, F., Mohammadi, S., Farahi, A., & Shahraki, K. (2022). External versus endoscopic dacryocystorhinostomy for primary acquired nasolacrimal duct obstruction. *Middle East African Journal of Ophthalmology, 29*(1), 1–6. https://doi.org/10.4103/meajo.meajo_238_21

Raslan, O. A., Ozturk, A., Pham, N., Chang, J., Strong, E. B., & Bobinski, M. (2019). A comprehensive review of cross-sectional imaging of the nasolacrimal drainage apparatus: What radiologists need to know. *American Journal of Roentgenology, 213*(6), 1331–1340. https://doi.org/10.2214/AJR.19.21507

Singh, S., & Ali, M. J. (2022). Normal anatomy of the lacrimal system. In *Atlas of Orbital Imaging* (pp. 279–282). Springer. https://doi.org/10.1007/978-3-030-62426-2_21

Somuk, B. T., Alim, S., Sapmaz, E., Demir, H. D., Taskiran, B., Goktas, G., & Soyalic, H. (2016). Comparison of endoscopic and external dacryocystorhinostomy results and analysis of patients' satisfaction. *Turkish Archives of Otolaryngology, 54*(3), 99–104. https://doi.org/10.5152/tao.2016.1722

Sundari, S. S., & Kontraiandi, C. (2020). A clinico-bacteriological study of dacryocystitis in children. *International Journal of Contemporary Pediatrics, 7*(3), 602–606. https://doi.org/10.18203/2349-3291.ijcp20200686

Venkatesh, & Shanker, B. M. (2024). Dacryocystitis – A study of its microbiological spectrum at a tertiary eye care hospital in Hyderabad, India. *Osmania Journal of Medical Research, 1*(1), 1–5.

Zhang, C., Cui, Y., Wu, Q., & Li, L. (2019). Computed tomography for guidance in the diagnosis and surgical correction of recurrent pediatric acute dacryocystitis. *Pediatric Investigation, 3*(1), 39–44. https://doi.org/10.1002/ped4.12115