

## Neonatal Epididymitis Presenting as Acute Scrotal Swelling: A Case Report

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### ABSTRACT

Acute scrotal swelling in neonates has various causes, with epididymitis being rare (<1%) and usually related to hematogenous spread from systemic infection. This report describes the clinical presentation, diagnosis, and management of neonatal epididymitis. A 5-day-old male neonate with respiratory distress and jaundice developed fever, tachycardia, and right scrotal swelling. Laboratory findings showed leukocytosis and elevated inflammatory markers. Doppler ultrasound revealed increased vascularity and heterogeneous appearance of the right testis, consistent with epididymitis. The patient was initially treated with ampicillin and gentamicin, later escalated to meropenem and amikacin due to clinical deterioration. Significant improvement followed, with resolution of symptoms after a two-week antibiotic course. Early recognition and appropriate management are essential, and testicular torsion must always be excluded.

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## **INTRODUCTION**

Acute scrotal swelling in neonates is an uncommon but potentially life-threatening condition that requires prompt evaluation to prevent irreversible testicular damage. The differential diagnosis includes testicular torsion, epididymitis, scrotal edema, and incarcerated inguinal hernia. Among these, testicular torsion is the most critical diagnosis to exclude because delayed management may result in testicular loss (Ali et al., 2025; Watari et al., 2025).<sup>1,2</sup>

Epididymitis is a well-recognized cause of acute scrotum in older children and adolescents; however, it is exceedingly rare in neonates, accounting for less than 1% of cases<sup>3,4</sup>. In contrast to older age groups—where infection typically arises from ascending urinary tract pathogens—neonatal epididymitis is more often associated with systemic infection and is thought to occur via hematogenous spread [Kunta et al., 2025; Liu et al., 2024]. This difference in pathophysiology underscores the importance of evaluating neonates with epididymitis for underlying sepsis or systemic illness.

The clinical presentation of neonatal epididymitis frequently overlaps with that of testicular torsion, including scrotal swelling, erythema, and tenderness, making accurate diagnosis challenging. This overlap increases the risk of misdiagnosis and may lead to unnecessary surgical exploration or delayed appropriate treatment (Ali et al., 2025; Watari et al., 2025). Therefore, timely and accurate diagnostic evaluation is essential.

Color Doppler ultrasonography plays a crucial role in distinguishing epididymitis from testicular torsion. Increased vascular flow and epididymal enlargement are characteristic findings of epididymitis, whereas decreased or absent blood flow suggests torsion (Ali et al., 2025; Kunta et al., 2025). However, laboratory findings may be inconclusive, as negative blood and urine cultures do not exclude infection in neonates (Liu et al., 2024).

This report aims to describe the clinical presentation, diagnostic approach, and management of neonatal epididymitis presenting as acute scrotal swelling, highlighting the importance of early recognition and appropriate treatment in this rare condition.

## **LITERATURE REVIEW**

### **Definition**

Neonatal epididymitis is defined as an inflammatory condition of the epididymis occurring within the first 28 days of life, typically presenting as acute scrotal swelling accompanied by erythema, tenderness, and, in some cases, systemic signs of infection. It represents a rare cause of acute scrotum in this age group, accounting for less than 1% of cases (Furugane et al., 2025; Liu et al., 2024).

In contrast to epididymitis in older and adolescents—where infection commonly arises from ascending urinary tract pathogens—neonatal epididymitis is generally associated with hematogenous spread of microorganisms in the context of systemic infection (Kuta et al., 2025; Liu et al., 2025). The diagnosis is primarily clinical, supported by imaging findings on color Doppler ultrasonography demonstrating increased vascularity and epididymal enlargement.

Given its clinical overlap with testicular torsion, a surgical emergency, neonatal epididymitis is often considered a diagnosis of exclusion, requiring careful and timely evaluation to ensure appropriate management (Ali et al., 2025; Watari et al., 2025).

### **Epidemiology**

Neonatal epididymitis is an exceptionally rare condition and represents a very small proportion of acute scrotal disorders in early life. Acute scrotum itself is uncommon in neonates, with most cases attributed to testicular torsion, hydrocele, or inguinal hernia. Epididymitis accounts for less than 1% of acute scrotal presentations in this age group (Furugane et al., 2025; Liu et al., 2024).

The true incidence of neonatal epididymitis remains unclear due to its rarity and the likelihood of underdiagnosis or misclassification, particularly in cases initially suspected as testicular torsion. Most available data are derived from isolated case reports and small case series rather than large epidemiological studies (Ali et al., 2025; Watari et al., 2025).

Epididymitis is significantly more common in older children and adolescents, where it is frequently associated with urinary tract infections or, in sexually active individuals, sexually transmitted pathogens. In contrast, neonatal cases are typically linked to systemic infections and may occur in the setting of sepsis, perinatal complications, or immunological vulnerability (Kunta et al., 2025; Liu et al., 2025).

No consistent demographic predisposition has been established in neonates; however, male sex is inherently affected due to the anatomical involvement of the epididymis. Some reports suggest that neonatal epididymitis may be associated with underlying risk factors such as prematurity, perinatal asphyxia, or invasive medical interventions, although evidence remains limited (Ali et al., 2025; Kunta et al., 2025).

Overall, the rarity of neonatal epididymitis and its overlapping presentation with more common surgical emergencies contribute to diagnostic challenges, emphasizing the need for heightened clinical awareness and appropriate use of imaging in suspected cases.

### **Pathophysiology**

The pathophysiology of neonatal epididymitis differs significantly from that observed in older children and adolescents. In post-neonatal populations, epididymitis is most commonly caused by ascending infection from the lower urinary tract, often associated with urogenital anomalies or sexually transmitted pathogens. In contrast, neonatal epididymitis is generally believed to result from hematogenous dissemination of microorganisms in the setting of systemic infection (Kunta et al., 2025; Liu et al., 2024).

During the neonatal period, the immune system is immature, making infants more susceptible to bacteremia and systemic infections. Pathogens circulating in the bloodstream can localize in the epididymis due to its rich vascular supply, leading to inflammation and edema. Reported causative organisms include Gram-negative bacteria such as *Escherichia coli* and *Salmonella* species, although microbiological confirmation is frequently lacking,

as blood and urine cultures may be negative despite clinical infection (Ali et al., 2025; Kunta et al., 2025).

Inflammation of the epididymis results in vascular congestion, increased permeability, and leukocyte infiltration, which clinically manifest as scrotal swelling, erythema, and tenderness. The inflammatory process may extend to adjacent structures, including the testis, resulting in epididymo-orchitis. Increased blood flow due to inflammatory hyperemia is a key feature distinguishing epididymitis from testicular torsion on Doppler ultrasonography (Furugane et al., 2025; Watari et al., 2025).

In some cases, neonatal epididymitis may be associated with perinatal risk factors such as asphyxia, invasive procedures, or prolonged hospitalization, which can predispose to systemic infection and subsequent hematogenous spread (Kunta et al., 2025; Liu et al., 2024).. However, the exact mechanisms remain incompletely understood due to the rarity of the condition and limited large-scale studies.

### **Diagnosis**

The diagnosis of neonatal epididymitis is challenging due to its rarity and its clinical overlap with other causes of acute scrotum, particularly testicular torsion, which must be urgently excluded. A thorough clinical, laboratory, and radiological evaluation is essential to establish the diagnosis and guide appropriate management.

Clinically, neonatal epididymitis typically presents with unilateral scrotal swelling, erythema, tenderness, and occasionally systemic signs such as fever or irritability. However, these findings are nonspecific and indistinguishable from testicular torsion based on physical examination alone (Ali et al., 2025; Watari et al., 2025). Therefore, reliance on clinical features alone is insufficient, and further diagnostic evaluation is required.

Laboratory investigations may reveal evidence of inflammation, including leukocytosis and elevated C-reactive protein levels. Despite this, blood and urine cultures are frequently negative in neonatal epididymitis and do not exclude the diagnosis, particularly when the infection is presumed to occur via hematogenous spread (Kunta et al., 2025; Liu et al. 2024)

Color Doppler ultrasonography is the imaging modality of choice and plays a pivotal role in differentiating epididymitis from testicular torsion. In epididymitis, ultrasound typically demonstrates increased vascular flow (hyperemia), epididymal enlargement, and heterogeneous echotexture. In contrast, testicular torsion is characterized by decreased or absent blood flow to the affected testis (Furugane et al., 2025; Watari et al., 2025). Additional findings may include reactive hydrocele or scrotal wall thickening.

In cases where imaging findings are inconclusive or when torsion cannot be definitively excluded, prompt surgical exploration may still be necessary. However, when Doppler ultrasound findings are consistent with epididymitis and clinical stability is maintained, conservative management can be safely initiated.

Overall, early and accurate diagnosis relies on a combination of clinical suspicion, supportive laboratory findings, and, most importantly, Doppler ultrasonography to differentiate epididymitis from surgical emergencies.

### **Management**

Overall, early and accurate diagnosis relies on a combination of clinical suspicion, supportive laboratory findings, and, most importantly, Doppler ultrasonography to differentiate epididymitis from surgical emergencies.

The management of neonatal epididymitis is primarily conservative and focuses on treating the underlying infection, providing supportive care, and closely monitoring clinical progression. A key principle in management is the prompt exclusion of testicular torsion, as this condition requires urgent surgical intervention. Once torsion has been reasonably ruled out through clinical and radiological evaluation, non-operative treatment can be safely initiated (Ali et al., 2025; Watari et al., 2025).

Empirical broad-spectrum antibiotic therapy is the cornerstone of treatment, given the presumed infectious etiology and the risk of systemic involvement. Initial antibiotic selection typically targets common neonatal pathogens, including Gram-negative organisms, and may include combinations such as ampicillin with an aminoglycoside. Antibiotic regimens should be adjusted based on clinical response and, when available, culture results, although cultures are frequently negative in neonatal cases (Kunta et al., 2025; Liu et al., 2024).

Supportive care plays an important role and may include adequate analgesia, scrotal elevation, and management of associated systemic conditions such as sepsis or respiratory distress. In hospitalized neonates, particularly those with comorbidities, close monitoring in a neonatal intensive care setting may be required.

Clinical improvement is generally observed within a few days of appropriate therapy, with reduction in scrotal swelling, pain, and systemic symptoms. A full course of antibiotics – typically ranging from 10 to 14 days – is recommended to ensure complete resolution of infection and to prevent recurrence (Furugane et al., 2025; Kunta et al., 2025).

Surgical intervention is not routinely indicated in confirmed cases of epididymitis but may be necessary when the diagnosis remains uncertain or when complications such as abscess formation or testicular ischemia are suspected. Follow-up evaluation, including repeat clinical assessment or imaging, may be considered to confirm resolution.

Overall, early recognition, appropriate antibiotic therapy, and careful monitoring are essential for favorable outcomes in neonatal epididymitis, while avoiding unnecessary surgical procedures.

### **METHODOLOGY**

This study is a descriptive case report of a neonate diagnosed with epididymitis presenting as acute scrotal swelling. The case was managed at the Department of Child Health, Haji Hospital of East Java. Clinical data were collected retrospectively from the patient's medical records.

Data collection included demographic information, perinatal history, clinical presentation, laboratory findings, imaging results, management, and clinical outcomes. Particular attention was given to signs of systemic infection, scrotal examination findings, and the use of color Doppler ultrasonography in establishing the diagnosis.

Diagnostic evaluation was performed through a combination of clinical assessment, laboratory investigations—including complete blood count, inflammatory markers, and blood and urine cultures—and radiological imaging. Color Doppler ultrasonography was utilized to differentiate epididymitis from other causes of acute scrotum, especially testicular torsion.

The patient was managed according to standard neonatal care protocols, including empirical antibiotic therapy, supportive treatment, and close clinical monitoring. Management changes were documented based on clinical progression and response to therapy.

A review of the relevant literature was also conducted to compare the findings of this case with previously reported cases of neonatal epididymitis, focusing on epidemiology, pathophysiology, diagnosis, and management.

Patient confidentiality was strictly maintained, and all identifying information was anonymized in accordance with ethical standards for case report publication.

## **RESULTS AND DISCUSSION**

### **Case Presentation**

A 5-day-old male neonate was referred with respiratory distress syndrome and neonatal jaundice. He was born at term with a history of perinatal asphyxia and was initially managed with continuous positive airway pressure (CPAP), showing favorable clinical progress.

On the second day of hospitalization, the patient developed signs of infection, including fever (38.2°C), tachycardia, and right scrotal swelling accompanied by erythema and tenderness.

Laboratory findings revealed leukocytosis (27,260/mm<sup>3</sup>), elevated C-reactive protein (21 mg/L), and hyperbilirubinemia (total bilirubin 11.72 mg/dL; direct bilirubin 1.84 mg/dL). Blood and urine cultures were negative.

Color Doppler ultrasonography demonstrated increased vascularity, epididymal enlargement, and heterogeneous appearance of the right testis without peritesticular fluid collection, findings consistent with right epididymitis (Turgut et al., 2007).

Following urology consultation, the patient was managed conservatively. Initial antibiotic therapy with ampicillin and gentamicin was escalated to meropenem and amikacin due to clinical deterioration. The patient subsequently improved, with resolution of fever and reduction of scrotal swelling. He completed a two-week course of antibiotics with good recovery.

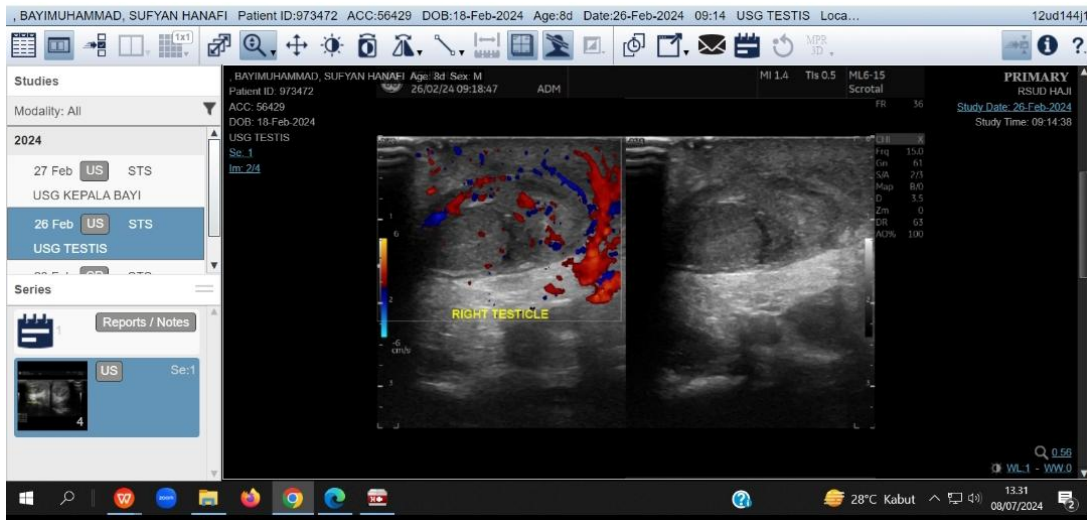


Figure 1. Testicular Ultrasound

Acute scrotal swelling in neonates represents a diagnostic emergency, primarily due to the need to promptly exclude testicular torsion, a condition that may lead to irreversible testicular damage if not treated urgently. Recent evidence continues to emphasize that testicular torsion remains the most time-critical diagnosis, with delayed recognition being a major contributor to testicular loss and long-term morbidity (Turgut et al., 2007).

Epididymitis is an uncommon cause of acute scrotum in neonates, accounting for less than 1% of cases. However, recent case reports and reviews highlight that neonatal epididymitis, although rare, is increasingly recognized in the context of systemic infection and atypical pathogens. For example, a recent 2024 case report described neonatal epididymo-orchitis associated with *Salmonella* infection, demonstrating that uncommon pathogens and environmental exposures may play a role in neonatal cases (Kunta et al., 2025).

The clinical presentation of epididymitis may closely mimic that of testicular torsion, including scrotal swelling, erythema, and tenderness. This overlap remains a major diagnostic challenge. Recent literature confirms that acute epididymitis in infants presents with similar symptoms, making differentiation difficult and increasing the risk of misdiagnosis (Watari et al., 2025).

Color Doppler ultrasonography plays a pivotal role in differentiating these conditions. Consistent with current evidence, increased vascularity is a hallmark of epididymitis, whereas decreased or absent perfusion is typical of torsion. Recent studies emphasize that Doppler ultrasound significantly improves diagnostic accuracy and helps avoid unnecessary surgical exploration when findings are consistent with inflammatory processes (Turgut et al., 2007).

In contrast to older children, where epididymitis is often associated with ascending urinary tract infections, neonatal epididymitis is more commonly linked to hematogenous spread. Recent pediatric studies confirm that systemic

infection plays a key role in younger age groups, whereas urinary tract-related causes predominate in older children (Lam et al., 2005).

Laboratory findings in this case, including leukocytosis and elevated inflammatory markers, further support an infectious etiology. However, negative blood and urine cultures do not exclude infection. This limitation is also reported in recent studies, where culture-negative infections are not uncommon, particularly in neonates with prior antibiotic exposure or low bacterial burden (Watari et al., 2025).

The management of neonatal epididymitis remains predominantly conservative. Recent reports demonstrate that early diagnosis combined with appropriate antibiotic therapy leads to favorable outcomes and avoids unnecessary surgical intervention (Kunta et al., 2025). In the present case, clinical improvement following escalation of antibiotics further supports this approach.

This case highlights several important clinical implications. First, epididymitis, although rare, should be considered in neonates presenting with acute scrotal swelling, especially in the presence of systemic infection. Second, Doppler ultrasonography is essential for accurate diagnosis and prevention of unnecessary surgery. Third, integration of clinical findings, laboratory markers, and imaging is critical for effective decision-making in this diagnostic dilemma.

## CONCLUSIONS AND RECOMMENDATIONS

Acute scrotal swelling in neonates is a medical emergency that requires prompt exclusion of testicular torsion. Although rare, epididymitis should be considered, particularly in the presence of systemic infection. Negative culture results do not exclude the diagnosis.

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