



# An Overview of the Latest Insights and Innovations in Pylephlebitis: A Comprehensive Review



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## Abstract

Pylephlebitis, a rare condition marked by infective thrombosis in the portal vein, presents diagnostic and therapeutic challenges. This review explores its epidemiology, etiology, clinical manifestations, diagnosis, and treatment. Primarily a complication of intra-abdominal infections, diverticulitis and appendicitis are prevalent causes. Clinical presentation mirrors intra-abdominal infections, demanding a high index of suspicion. Diagnosis involves clinical examination, laboratory investigations, and imaging, with CT and ultrasound commonly employed. Treatment integrates broad-spectrum antibiotics and surgical interventions targeting the infection source. Prognosis, influenced by prompt diagnosis and complications, reports mortality rates of 7-30%. Early recognition and aggressive management are pivotal for favorable outcomes, emphasizing a comprehensive approach to Pylephlebitis prevention, diagnosis, and treatment.

**Keywords:** Pylephlebitis; Portal vein thrombosis; Intra-abdominal infections; Leukocytosis; Gastrointestinal distress

**Abbreviations:** CT: Computed Tomography; MRI: Magnetic Resonance Imaging; CRP: C-Reactive Protein; ESR: Erythrocyte Sedimentation Rate; ALP: Alkaline Phosphatase; ALT: Alanine Aminotransferase; AST: Aspartate Aminotransferase; GGT: Gamma-Glutamyl Transpeptidase; US: Ultrasonography; PET: Positron Emission Tomography

## Introduction

Pylephlebitis, a rare condition, refers to infective suppurative thrombosis within the portal vein, typically arising as a complication of intra-abdominal suppurative processes. Its incidence is low, estimated at approximately 0.37-2.7 cases per 100,000 person-years. Virtually any intra-abdominal or pelvic infection with drainage through the portal venous system can

lead to pylephlebitis. Notably, diverticulitis (26.5%) and acute appendicitis (22%) are the most frequent underlying causes attributed to the anatomical proximity of the inflamed structures to the portal system. Additionally, contiguous infections such as cholangitis/cholecystitis (3.5%) or pancreatitis (5.5%) can precipitate pylephlebitis. In 8.5% of cases, hepatic abscesses are implicated. Pathogens commonly associated with pylephlebitis

include *Escherichia coli*, *Bacteroides* spp., and *Streptococcus* spp., while fungal and parasitic infections are occasional etiologies [1,2]. Symptomatically, patients typically present with fever, abdominal pain, nausea/vomiting, and diarrhea. Laboratory investigations often reveal leukocytosis, elevated C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), hyperbilirubinemia, anemia, hypoalbuminemia, and thrombocytopenia. Diagnosis hinges on confirming portal vein thrombosis in febrile patients with bacteremia, achieved through pathogen identification via culture and imaging studies such as CT scan, MRI, angiography, endoscopic ultrasound, or positron emission tomography [1,2]. Treatment entails broad-spectrum antibiotics tailored to the suspected source of infection and likely pathogens, with adjustments based on culture and antimicrobial susceptibility testing results. Therapy typically spans four to six weeks post-symptom onset, initially administered intravenously until significant clinical improvement is observed, followed by oral administration, often a combination of metronidazole and fluoroquinolones, to complete the course [1,2].

### Etiology & Pathogenesis

Pylephlebitis is a rare condition associated with intra-abdominal infections in areas neighboring or drained by the portal vein and its tributaries [3,4]. A retrospective study with one hundred relevant cases identified diverticulitis as the leading cause of pylephlebitis, followed by appendicitis [5]. Another study with ninety-five patients highlighted pancreatitis as the main predisposing factor [6]. Bacteremia was present in 88% of cases, with *Bacteroides fragilis* and *Escherichia coli* being the most common agents [7,8]. Pylephlebitis results from thrombosis of a vein adjacent to an infected area, extending to main branches and damaging additional tissue and organs. In cases involving cholangitis/cholecystitis and hepatic abscess, it is challenging to determine if these conditions caused or resulted from pylephlebitis. Some cases have no established source of infection [8]. This infectious pathology can lead to portal vein thrombosis. Its multifaceted etiology includes bacteria as a primary cause [3]. Bacteria colonizing smaller thrombophlebitis veins can lead to septic emboli and pylephlebitis [6]. A recent systematic review showed that out of 220 individuals, a single pathogen was found in 155 cases (70.5%), with a median age in the 50s and the youngest at 20 years old [3-5]. Studies revealed diverticulitis and appendicitis as leading causes of pylephlebitis, with the former prevalent in younger individuals and the latter in seniors [3]. Other highly contagious infectious diseases, such as Gastroenteritis, Cholangitis, pancreatitis, invasive liver procedures, endometriosis, Upper urinary tract infections, and umbilical catheterization, also elevate the risk [3,5].

### Epidemiology & Risk Factors

Pylephlebitis, a rare medical condition, exhibits a multifaceted epidemiology with various associated risk factors. A retrospective study involving one hundred cases identified diverticulitis as the predominant cause, followed closely by appendicitis [7].

Furthermore, pancreatitis emerged as a significant predisposing factor in a study involving ninety-five patients [9]. Bacteremia was notably present in 88% of cases, with *Bacteroides fragilis* and *Escherichia coli* being the most frequently isolated agents [10]. Pylephlebitis, characterized by thrombosis of veins adjacent to infected areas, leads to extension into main branches, damaging surrounding tissues and organs [1]. The causal relationship with pylephlebitis remains challenging to ascertain in cases involving cholangitis/cholecystitis and hepatic abscess [10]. Additionally, recent systematic reviews emphasize the prevalence of diverticulitis and appendicitis, particularly in younger and senior populations respectively [6]. The etiology of Pylephlebitis is intricate and primarily rooted in bacterial infections. Notably, bacteria within smaller thrombophlebitis veins contribute to septic emboli formation, further exacerbating the development of Pylephlebitis [9]. A systematic review of 220 individuals demonstrated that a single pathogen was identified in 70.5% of cases, with males and individuals in their 50s mainly affected [1]. Beyond diverticulitis and appendicitis, other infectious diseases, including Gastroenteritis, Cholangitis, pancreatitis, invasive liver procedures, endometriosis, Upper urinary tract infections, and umbilical catheterization have been identified as additional risk factors [1,7]. This intricate interplay of factors underscores the complexity of Pylephlebitis epidemiology and necessitates a comprehensive understanding of effective clinical management [1].

### Clinical Manifestations

In the clinical presentation of Pylephlebitis, upon admission, fever and abdominal pain stand out as the most reported symptoms. Additionally, patients often report symptoms such as nausea, vomiting, and diarrhea. A comprehensive clinical examination frequently reveals tenderness in the right upper quadrant or the abdomen, accompanied by potential findings of hepatomegaly, splenomegaly, and, occasionally, unusual jaundice [1]. Jaundice, specifically, tends to manifest when hepatic involvement becomes disseminated [7]. It's crucial to note that these symptoms can contribute to clinical confusion, as they closely resemble the presentation of intra-abdominal infections, which play a pivotal role in the pathogenesis of pylephlebitis [1]. As the condition progresses, patients may develop signs indicative of sepsis and multi-organ failure [3]. Given the nonspecific nature of the initial symptoms, maintaining a high suspicion index is essential to facilitate early diagnosis and prevent complications [11]. The similarity in presentation to intra-abdominal infections underscores the need for a thorough clinical evaluation and diagnostic workup to differentiate Pylephlebitis from other abdominal conditions and initiate timely and appropriate interventions.

### Diagnosis and Laboratory Evaluation

The diagnosis of pylephlebitis continues to be a challenge. At present, there are no established criteria for diagnosing pylephlebitis. During the history and physical exam, patients

usually exhibit nonspecific symptoms, including fever, fatigue, nausea, vomiting, diarrhea, abdominal pain, abdominal tenderness, weight loss, enlargement of the liver and spleen, ascites, and jaundice if there is a widespread liver involvement. Pylephlebitis is diagnosed based on imaging findings of a thrombus in the portal vein in conjunction with sepsis and corresponding clinical manifestations of the disease [1,2,12]. However, thrombosis in the portal vein alone is insufficient to validate the diagnosis of pylephlebitis [2]. The patients initially exhibit leukocytosis during the early stages of the disease [1,2,12]. However, it is essential to note that the absence of leukocytosis, or the presence of average white blood cell count, leukopenia, or neutropenia, does not definitively exclude the possibility of the condition.

Elevated levels of liver enzymes, including alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), and gamma-glutamyl transpeptidase (GGT), are frequently observed in these patients. Bilirubin levels often remain within the normal range in these patients unless there is extensive liver involvement [2]. Most patients with pylephlebitis have positive cultures, although there have been instances where blood cultures were negative [1]. Therefore, the absence of positive blood cultures does not preclude the presence of pylephlebitis [1]. Before commencing antimicrobial medication, it is crucial to acquire blood cultures. Polymerase chain reactions have demonstrated enhanced sensitivity in identifying the etiological microorganisms in individuals with sepsis-associated pylephlebitis [1]. Computed tomography (CT), color flow Doppler ultrasonography (US), magnetic resonance imaging (MRI), and positron emission tomography (PET) scans are all viable methods for diagnosing pylephlebitis and detecting portal vein thrombosis [1,2,12,13]. Studies indicate that CT and US are the most commonly utilized imaging techniques [1,2,12,13]. CT has demonstrated its superiority over the US due to its capacity to identify other related problems, such as hepatic abscesses, mesenteric ischemia, and intestinal ischemia [1,2].

### Prevention & Treatment Strategies

Preventing and treating Pylephlebitis involves a multifaceted approach to address the underlying intra-abdominal infections. Early recognition and aggressive management of infections, particularly diverticulitis and appendicitis, are paramount in preventing the progression to Pylephlebitis [14]. Antibiotic therapy plays a central role in preventing and treating Pylephlebitis, targeting the bacterial agents involved in the infection. Timely administration of appropriate antibiotics is crucial to minimize the risk of septic complications and reduce the extension of thrombosis in the portal vein [10]. In cases where a specific pathogen is identified, tailored antibiotic therapy based on susceptibility testing is recommended [15]. Furthermore, interventions addressing the source of infection, such as surgical removal of an inflamed appendix or diverticula, can contribute significantly to preventing recurrence and reducing the likelihood of Pylephlebitis [14]. In the treatment phase, managing sepsis and multi-organ

failure becomes imperative. Aggressive supportive care improves patient outcomes, including hemodynamic stabilization, fluid resuscitation, and organ support [9]. Regular monitoring of clinical and laboratory parameters is essential to assess the response to treatment and identify potential complications early on [15]. A comprehensive approach to preventing and treating Pylephlebitis involves promptly recognizing and managing underlying intra-abdominal infections and targeted antibiotic therapy. Surgical interventions addressing the source of infection play a crucial role in preventing recurrences. Timely and aggressive supportive care is essential in the treatment phase, emphasizing the importance of close monitoring for a favorable clinical outcome.

### Prognosis

The prognosis of Pylephlebitis is contingent upon various factors, including the promptness of diagnosis, the effectiveness of the initiated treatment, and the presence of underlying comorbidities. While advancements in diagnostic techniques and therapeutic modalities have improved outcomes, the condition's severity often dictates the prognosis. Mortality rates have historically been reported to range from 7% to 30%, underscoring the potential seriousness of Pylephlebitis [16,17]. Early recognition and aggressive management of intra-abdominal infections, the primary culprits of Pylephlebitis, are pivotal in influencing the clinical trajectory and mitigating complications [18]. Cases where sepsis and multi-organ failure ensue tend to carry a more guarded prognosis, emphasizing the importance of timely interventions and vigilant monitoring [19]. Despite the challenges, successful outcomes have been reported with antibiotic therapy, surgical interventions addressing the source of infection, and supportive care [14].

### Conclusion

Pylephlebitis, a rare condition resulting from infective suppurative thrombosis in the portal vein, presents a diagnostic and therapeutic challenge. The condition primarily emerges as a complication of intra-abdominal infections, with diverticulitis and appendicitis being the most prevalent underlying causes. The clinical manifestations include nonspecific symptoms such as fever, abdominal pain, and gastrointestinal distress, mimicking intra-abdominal infections, necessitating a high index of suspicion. The diagnostic process involves a combination of clinical examination, laboratory investigations, and imaging studies, with computed tomography (CT) and ultrasound being commonly utilized. Treatment comprises broad-spectrum antibiotics tailored to the suspected source of infection, along with surgical interventions addressing the underlying cause. Prognosis varies, influenced by factors like promptness of diagnosis and the presence of complications, with mortality rates historically ranging from 7% to 30%. Early recognition and aggressive management are pivotal in improving outcomes, highlighting the need for a comprehensive and timely approach to Pylephlebitis prevention, diagnosis, and treatment.

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