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Early Dermatologic Manifestations of Periprosthetic Joint Infections and Diagnostic Significance: A Literature Review

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ABSTRACT

Periprosthetic joint infections (PJIs), also known as prosthetic joint infections, are a complex orthopedic complication, with significant costs to the patient and healthcare system. The Musculoskeletal Infection Society (MSIS) updated criteria provides an organized method to help orthopedic surgeons with their diagnostic evaluation of PJIs. However, a periprosthetic joint infection (PJI) presentation can be insidious with non-specific symptoms or emulate other forms of infections, such as cellulitis. Dermatologic signs can be an initial clue of an underlying PJI, such as increased erythema and swelling of the affected joint, which can present acutely or chronically, with variability in severity and presentation. Early PJIs often manifest with joint pain and impaired wound healing, while chronic cases primarily present as persistent pain, and can mimic noninfectious etiologies like aseptic loosening of components. Recent advancements are improving diagnostic accuracy and expediting treatment. However, more precise screening criteria and novel detection strategies, particularly in examination of dermatologic signs, are necessary to improve early diagnosis of a PJI and enhance patient outcomes. This review explores the diagnostic challenges in recognizing

dermatologic signs of PJIs, their role in diagnosis, and future directions for improved diagnosis and outcomes.

Keywords: Periprosthetic Joint Infection, Arthroplasty, Orthopedic Surgery, Dermatology, Surgical Infection

INTRODUCTION

Joint arthroplasty can be a life-enhancing procedure that is predicted to reach 3.48 million by 2030 in the United States alone [1]. Successful joint arthroplasty improves function, relieves pain, and overall increases the patient's quality of life [1]. However, a minority of these cases necessitate additional surgical procedures due to implant loosening, improper implant placement, dislocation, wear and tear of prosthetic material, and periprosthetic joint infections (PJIs) [1]. The diagnosis of PJIs can be challenging due to the variable clinical manifestations and the often insidious nature of its presentation [1]. Once clinical suspicion arises, prompt diagnosis is required to reduce the risk of long-term negative functional outcomes [2]. Advancements in understanding the causes, effects, and management strategies for PJIs are crucial for timely diagnosis and improving patient outcomes.

The updated 2018 criteria, which build upon the 2011 Musculoskeletal Infection Society (MSIS) definition of a periprosthetic joint infection (PJI), incorporate a refined scoring system and diagnostic tests to improve accuracy and further enhance diagnosis [3]. Identifying the cause of infection is critical using these criteria for diagnosis, such as two positive culture tests, a sinus tract, elevated synovial fluid leukocyte and neutrophils counts (>3000 cell/uL and >80% respectively), positive synovial fluid alpha-defensin, sonicate-fluid culture (>50 CFU/mL for any organism and >200 CFU/mL if centrifuged), and histopathological assessment [3]. The grading scale assigned for each of the components of the major criteria are three points each for the presence of leukocyte esterase, elevated white blood cell (WBC) count, and alpha-defensin positive in synovial fluid, whereas C-reactive protein (CRP >1 mg/dL) and D-dimer (860 ng/mL) are two points each [3]. Neutrophils and elevated erythrocyte sedimentation (ESR) rates are one point each [3]. An overall aggregate score of greater than six is considered an infection, and any score between two and five may require further evaluation, whereas a score under three indicates an infection is unlikely [3].

Many of the symptoms of PJIs are nonspecific, but dermatologic signs can present in both the acute and chronic settings [1]. PJIs present diagnostic challenges due to nonspecific and variable symptoms, from localized inflammation to systemic signs. Surgical site infections and poor wound healing, which can be further compounded by immunologic conditions, are notable risk factors for PJIs [4-6]. Diagnosis requires combining clinical evaluation, serological markers, synovial fluid analysis, imaging, and tissue cultures [3]. However, laboratory methods are limited by false-positive rates and many joint arthrocentesis results being culture-negative [1]. The purpose of this review is to explore the diagnostic challenges in recognizing early dermatologic signs of PJIs, their role in diagnosis and outcome, and propose areas for advancement in diagnosis.

METHODS

Seven reviewers independently assessed studies using data sources: Google Scholar, PubMed, OpenEvidence, and Scopus. They searched between February 10th, 2025, and February 26th, 2025 using the keywords: "periprosthetic joint infection," "orthopedic surgery," "dermatologic signs," "total joint arthroplasty," "osteomyelitis," and "implant" in combination. Inclusion criteria required peer-reviewed systematic reviews, other literature reviews, case studies, cohort studies, and randomized controlled trials that investigated periprosthetic joint infections caused by staphylococcal species, anaerobic bacteria, and fungi. The included literature discussed clinical presentation in various phases of infection (e.g. subacute, acute, chronic). Articles not related to these topics were excluded, as well as non-English publications.

Clinical Implications and Outcomes

The symptoms of periprosthetic joint infections (PJIs) range from local manifestations at the joint to systemic signs, which can vary depending on infection acuity [7]. In early PJIs, patients commonly experience swelling, erythema, and pain localized to the affected joint [7]. Additional findings may include sinus tract formation, prosthetic loosening, impaired wound healing, or skin necrosis [7]. Hematogenous infections are a major contributor in acute or chronic PJIs, which present with similar symptoms [8]. Chronic PJIs, typically considered greater than three to four weeks postoperatively, commonly manifest as pain in the affected joint and are typically attributed to infectious processes resulting from surgery, but can also be of immunologic and other noninfectious etiologies [6]. Presentation of a patient with a recent history of joint arthroplasty, in addition to any of the aforementioned signs and symptoms, will likely warrant further testing to

confirm the presence of a periprosthetic joint infection (PJI) [6]. Recognition of cutaneous signs – erythema, swelling, wound dehiscence – is essential at this stage of diagnosis [6]. While these signs can present similarly to other acute infections like cellulitis, sinus tract formation is a diagnostic hallmark of chronic PJIs [6]. Sinus tracts that connect to the underlying joint are a clear dermatological sign of a PJI, unlike many of the other nonspecific signs previously mentioned.

Aseptic loosening and PJIs are the two leading causes of implant failure following joint arthroplasty, which must be differentiated for proper diagnosis and treatment [9]. Aseptic loosening refers to failure of the implant due to noninfectious etiologies, such as mechanical wear and immunologic responses to the implant [9]. Implant loosening is often associated with a PJI, further complicating making a definitive diagnosis [9]. The characteristic determining factor of a PJI is a microorganism being the causative factor [9]. While differentiating between aseptic loosening and PJI remains a challenging task, the previously mentioned hallmark signs of infection – including erythema, swelling, wound dehiscence, and sinus tracts – increase the likelihood of a PJI [6,10]. Pain is likely to be present in both conditions of implant failure [9]. Studies have shown that a PJI due to atypical microorganisms may be initially misdiagnosed as aseptic loosening, further complicating the diagnosis [9]. However, new biomarkers in synovial fluid [11] and MRI with metal artifact reduction [12] have shown promise in improving the ability to differentiate between these conditions.

Early identification of deviations from a typical postoperative healing course will assist the clinician in PJI diagnosis. Surgical incisions undergo various stages of repair, with complete healing of superficial tissues in patients without PJI around 6 weeks [13]. Wound dehiscence, often associated with a PJI, may delay this process and result in slow healing or failure to heal the surgical incision [13]. Erythema and swelling, though hallmark indicators of infection, also present in the normal healing process [13]. In the setting of TKA, swelling increases daily, peaking between six to eight days, and gradually tapers over the following months if the healing process proceeds without complication [14]. Hyperemia surrounding the incision is expected during the proliferative phase of wound healing due to angiogenesis, granulation tissue formation, and deposition of collagen and may resemble the characteristic erythema found in a PJI [13]. Excessive or persistent swelling and erythema outside of these parameters are not typically seen postoperatively after TKA, which can signify a possible PJI or other complications [13]. It is important to note that individuals with other medical comorbidities, such as congestive heart failure or peripheral vascular disease, may have longer periods of elevated swelling postoperatively. Therefore, considering the patient's medical history is important in assessing expected versus abnormal dermatologic findings.

Elevated white blood cell (WBC) count and serological biomarkers, such as erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), are sensitive but not specific for PJIs [15]. Synovial fluid analysis and cultures are more specific for PJIs and are often utilized in clinical decision making prior to operative interventions [15]. With several existing methods of classifying PJIs, a definitive diagnosis may differ depending on the guidelines used.

Accurately characterizing PJIs is crucial to formulating a treatment plan and optimizing patient outcomes, with the most widely used diagnostic systems being from the Musculoskeletal Infection Society (MSIS), the International Consensus Meeting on Musculoskeletal Infection Society (ICM), and the European Bone and Joint Society (EBJIS) [6]. Each diagnostic system includes its own set of criteria that, in conjunction with early detection of dermatologic signs mentioned previously, serve to guide an orthopedic surgeon to a timely PJI diagnosis [6]. The MSIS criteria are commonly utilized and rely primarily on laboratory data [3]. The ICM builds on this by incorporating other biomarkers, such as alpha-defensin, with the potential to improve infection chronicity assessment [16]. EBJIS combines clinical, laboratory, histologic, and imaging data [17]. EBJIS places a unique emphasis on dermatologic signs like erythema as a non-specific, clinical attribute [17]. Though less widely used as a diagnostic tool in PJI diagnosis outside of Europe, the EBJIS has demonstrated greater sensitivity when compared to MSIS and ICM criteria [18]. Although all of these are valid starting points for diagnosing a PJI, there is no clear consensus about when to use one diagnostic system compared to another. The use of one set of guidelines differs in geographic practice patterns. Recent literature concluded that the 2011/2013 MSIS definition of PJI is the most commonly cited through 2022, despite newer definitions [10]. These diagnostic criteria highlight how cutaneous signs can help with the diagnosis of a PJI. However, thorough clinical examination and laboratory testing are also necessary except in cases with a sinus tract

communicating with the joint, which, under the MSIS 2018 criteria, is an automatic PJI diagnosis [3].

Though loosely based on the guidelines preceding them, each society has outlined specific and differing PJI criteria, exemplifying the need for homogeneity in PJI characterization and diagnosis. Cutaneous findings on examination are included in each definition to some extent – wound dehiscence, purulent drainage, erythema, and swelling – demonstrating the dermatological significance, especially in early diagnosis when other specific biomarkers may be within normal limits [3]. Due to the variability and often nonspecific dermatologic manifestations, PJIs are typically not able to be confirmed or excluded from the differential without further workup.

Microorganisms of Periprosthetic Joint Infections

Periprosthetic joint infections (PJIs) can be caused from many different microorganisms. A retrospective study of 115 PJI cases found that staphylococcal species accounted for 66% of the total isolated organisms. The remaining causes were non-staphylococcal aerobic bacteria, anaerobic bacteria, and fungi [19]. *Staphylococcus aureus* and other coagulase-negative staphylococci (CoNS) have been identified in the majority of PJIs, and a significant distinction between the two is that *S. aureus* is associated with more acute infections [2]. A review of 20 cohort studies on PJIs found that other significant contributors to acute infection include *beta-hemolytic Streptococci* and gram-negative bacilli [2]. Due to the high virulence of these organisms, they present with signs of acute inflammation of the joint, accompanied by dermatologic signs, such as erythema and warmth [2]. In a retrospective analysis of PJIs due to *S. aureus* and CoNS, the majority of CoNS cases were observed in the setting of a revision arthroplasty that were hypothesized to have been initially misdiagnosed as aseptic failure [20]. As such, along with their ability to form biofilms on prosthetic surfaces, they generally manifest as indolent or chronic infections with either no symptoms or develop into sinus tract formation [20]. Therefore, chronic PJIs from these microorganisms typically require surgical treatment to mechanically remove biofilms.

In a systematic review of 45 cases of fungal PJIs by Schoof et. al, 84% of infections showed local signs of infection, such as erythema, swelling, and warmth [21]. Outcomes following several surgical treatments were analyzed in this study, with delayed two-stage revision arthroplasty (58%) and debridement, antibiotics, and implant retention (DAIR) (11%) making up the majority of procedures [21]. 11 of these cases were resistant to treatment, which presented with a joint effusion persisting following surgical treatment [21]. Three of the patients in the resistant group continued to display cutaneous signs of infection [21]. Five patients required further medical suppression of the infection with fluconazole. Three patients experienced a recurrence of their PJI [21]. Therefore, fungal infections are often difficult to treat and often require extensive surgical and medical management.

Anaerobic PJIs, such as *Escherichia coli*, generally have subtler clinical features and often result in a chronic infection [22]. They are also less common than staphylococcal organisms. Pain is generally the primary symptom, which makes it difficult to differentiate from aseptic implant failure [22]. As such, there are no specific major symptoms associated with anaerobic PJIs to differentiate it dermatologically from other PJI microorganisms [22]. The ability to differentiate aseptic loosening compared to a PJI is typically challenging, so many orthopedic surgeons presume there is a PJI until proven otherwise with negative cultures, and considering other laboratory and radiographic data.

Current Treatment Methods

Treatment of periprosthetic joint infections (PJIs) can vary significantly depending on the progression of infection. In the case of early diagnosis with immunocompetent patients, debridement, antibiotics, and implant retention (DAIR) is typically utilized [8]. This involves aggressive irrigation and debridement of the infected joint and tissues, often with replacement of the polyethylene component of the prosthesis, while leaving the implant in place [8]. This method of treatment decreases pathogen burden in conjunction with intensive antibiotic therapy. DAIR may be contraindicated in immunocompromised patients or in chronic PJIs, so other options like a single-stage or two-stage revision may be utilized [8].

Oral and/or intravenous antibiotics are given once the infectious organism(s) are identified [23]. Sometimes, despite all efforts to identify the culprit organism, cultures remain negative [24]. In these cases, a broad-spectrum antibiotic, such as vancomycin, is often used in conjunction with a revision arthroplasty procedure [23]. The type of antibiotic and length of usage vary, with no clear consensus in the orthopedic literature [23]. Four to six weeks of antibiotics

are often administered postoperatively [23]. However, some patient populations may require a prolonged oral antibiotic suppression regimen, especially those with recurrent PJIs [23].

Chronic PJIs generally require extensive measures to fully eradicate the infection, such as operative interventions. One- or two-stage revision arthroplasty procedures are typically involved and require the removal of all prosthesis components, along with aggressive debridement of the infected joint and surrounding tissues [25]. Debridement and removal of the infected prosthesis, as well as replacement with a new prosthesis, take place in one surgery in one-stage exchange arthroplasty [25]. In two-stage exchange arthroplasty, an antibiotic spacer is placed, and the patient typically undergoes four to six weeks of pathogen-specific oral and intravenous antibiotics prior to receiving their new implant [26]. When the infection has cleared, the patient may undergo revision arthroplasty and receive a new prosthesis [8]. Antibiotic therapy may be utilized before, during, and after each stage to fully eradicate infectious organisms [8]. Even with treatment, outcomes following PJIs remain susceptible to a higher risk of mortality than primary joint arthroplasty [26]. The five-year mortality following total knee arthroplasty (TKA) more than doubles in patients with a PJI from 7.1% to 15.7%, demonstrating the necessity of early diagnosis and treatment to optimize patient outcomes [26]. Therefore, early diagnosis and appropriate treatment are crucial in helping to reduce patient morbidity and mortality.

Importance of Early Diagnosis

It is imperative to identify possible risk factors preoperatively to minimize the risk of developing a periprosthetic joint infection (PJI). Some modifiable risk factors that can increase the risk of developing a PJI include diabetes, malnutrition, obesity, and smoking [27]. A PJI often presents with non-specific symptoms, which can lead to challenges in the diagnosis. There are numerous classifications for categorizing and diagnosing a PJI, with different criteria emphasized by various orthopedic societies [15]. Dermatologic signs are often associated with PJI. However, they are typically nonspecific, such as erythema at the incision site [1]. While the presence of a sinus tract is considered a definitive dermatological sign of PJI, it may present after other nonspecific indicators [1]. Although these factors are ambiguous, they have clinical significance because the treatment of a PJI depends on its acuity. A delay in appropriate antibiotic and surgical therapy may negatively impact the ability to preserve the prosthesis or joint function [28]. The treatment for a chronic PJI, compared to an acute PJI, typically involves more aggressive treatments to effectively eradicate the infection [27]. Early diagnosis of PJI is crucial to minimizing damage to the affected joint and preserving patient function post-treatment.

Recognizing the dermatologic manifestations of PJI has the potential to aid in timely diagnosis. Although the types of dermatologic signs associated with a PJI are broad, they are useful in the initial stages of creating a differential diagnosis [29]. Arvieux et al. discussed an algorithm utilized in diagnosing a PJI [29]. The presence of inflammation and drainage through an incision helps guide the clinician on the next appropriate steps in the diagnostic evaluation [29]. Although possessing certain dermatologic manifestations is not needed to confirm the diagnosis of PJI, they can play a critical role in recognizing the diagnosis early [29]. For example, if a sinus tract is seen, a PJI is diagnosed even if laboratory values are within accepted ranges, which may occur in chronic PJIs with lower virulent organisms [30]. Therefore, dermatologic manifestations remain an important factor in the diagnostic workup of a possible PJI.

The dermatological signs of periprosthetic joint infections (PJIs) overlap with various other pathologies like superficial infections, inflammatory arthritis, or even a deep vein thrombosis [31]. Early-stage PJIs often exhibit subtle and nonspecific dermatological signs, such as erythema, warmth, and a joint effusion [31]. These symptoms can easily be mistaken for other conditions, such as cellulitis, allergic reactions, or postoperative changes, which can complicate the diagnostic process [32]. Del Pozo et al. described pain as the most common symptom of a PJI, with acute cases often presenting with severe pain, swelling, erythema, warmth, and a fever [32]. Differentiating between normal postoperative changes and early signs of infection is limited due to their non-specific nature [32]. A comparative study review of the definition of surgical site infections by Horan et al. emphasized the importance of recognizing that peri-incisional erythema can be a normal part of healing [33]. Additionally, the presence of a localized granulomatous response to a foreign body is not classified as a superficial surgical site infection [33]. While some pain, erythema, and warmth are expected postoperatively, their persistence or intensification beyond the typical healing period may suggest infection [33]. Such signs warrant closer examination to differentiate between normal healing and potential infection. Figure 1 provides a summary

list of dermatologic, localized, and systemic symptoms that may serve as red flag indicators for early identification of a PJI.

Figure 1. Red Flag Symptoms for Periprosthetic Joint Infections

Dermatologic Signs	- Sinus tract formation over affected joint space - Persistent erythema or warmth - Wound dehiscence - Purulent drainage
Localized Joint Signs	- New or worsening joint pain - Joint effusion - Warmth
Systemic Signs	- Fever - Elevated C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) - Leukocytosis

A combination of clinical evaluation, laboratory markers (e.g., ESR, CRP), synovial fluid analysis, and imaging is typically needed to diagnose a PJI. A review by Nelson et al. discussed the need for a multidisciplinary approach to improve diagnostic accuracy in PJIs [6]. The overlapping dermatological signs complicate the diagnostic process as clinicians must differentiate between various other possibilities to accurately identify PJIs [6]. The use of laboratory markers can be useful in this aspect [6]. However, these tests are not necessary for diagnosis when infection is evident and have a significant false-positive rate, particularly immediately after prosthesis implantation or in patients with inflammatory arthritis [34]. Additional diagnostic methods, such as imaging studies and microbiological evaluations, are often required to accurately identify an infection [34]. These methods also have their own limitations, such as false-positive results or the inability to detect biofilm-associated infections, which further complicates the diagnostic process [35]. Therefore, orthopedic surgeons must consider multiple factors – dermatologic, laboratory, clinical, and radiographic findings – to help with assessing for a PJI.

One of the most critical challenges in treating prosthetic joint infections (PJIs) is delayed diagnosis, which can significantly diminish the effectiveness of debridement, antibiotics, and implant retention (DAIR) [36]. A retrospective review by Zhang et al. demonstrated a high success rate of DAIR in acute PJIs, particularly for staphylococcal infections, when symptoms persist for more than four weeks [36]. The success of DAIR is highly dependent on the timing of debridement following symptom onset and the exchange of modular components during the initial procedure [37]. These findings highlight the importance of timely diagnosis, which can be facilitated by early recognition of dermatologic changes at the site of the prosthesis. However, the early dermatologic manifestations of PJIs are often subtle and nonspecific [1]. A comprehensive approach that incorporates careful clinical evaluation and the appropriate use of diagnostic tools is essential for effective management.

Limitations & Future Directions

This literature review has many limitations. Notably, this is a narrative review with potential for bias. There is a lack of literature outlining specific dermatologic manifestations of periprosthetic joint infections (PJIs) outside of sinus tracts, as many dermatologic manifestations are nonspecific. Therefore, challenges remain in creating guidelines for assessing dermatologic symptoms of PJIs and differentiating other etiologies of swelling, erythema, and pain without further data, such as laboratory and radiographic results.

The future of diagnosing and treating prosthetic joint infections is rapidly developing, as innovative technologies are continuously researched and implemented into practice. Blood serum-based markers for prosthetic joint infection (PJI) diagnoses are becoming increasingly useful, as they possess the ability to provide organism-specific diagnoses while being

minimally invasive and easy to utilize [11]. Beyond serum-based markers, biomarkers within the synovial fluid are also gaining traction as potential indicators of infection. Specifically, the increase of C-reactive protein (CRP) and D-dimer in synovial fluid of patients with PJI has shown high sensitivity [11]. While identifying biomarkers in biospecimens represents a recent advancement in the field, tissue culture remains a crucial step in identifying infection sources and ultimately determining treatment options [1]. A culture-negative PJI may result from inadequate use of available methods, with a frequency of 7-15% of PJI cases being culture-negative [1]. However, other studies note higher incidences of culture-negative PJIs [1]. A recent method that improves upon current culture techniques includes implant sonication. Sonication functions by sending sound waves in the ultrasound spectrum through fluid, which disrupts intercellular connections, disorganizes the biofilm, and releases bacteria, ultimately enhancing the recovery of microorganisms during the culturing process [38]. This innovative culture approach, combined with serum-biomarker analysis and a detailed physical examination with careful consideration of early dermatologic signs, demonstrates promising efficacy in improving the accuracy and speed of treating PJI, ultimately leading to more effective treatment modalities.

Improving screening techniques has been a current area of focus that may show promise in the early detection and improved diagnostic accuracy of PJIs [39]. There are various PJI screening criteria, with each having its own specificity and sensitivity [39, 40]. There is no universally accepted criterion due to the diverse clinical presentation of PJIs [39, 40]. The current criteria involve using a combination of microbiological, histopathological, and synovial biomarker analysis along with imaging [39]. The widely accepted classification of PJIs is divided into three stages based on the timing of the infection. This classification system lacks specific clinical presentations for each stage [40]. As a result, numerous proposals have been made to revise this classification, one of which involves shifting the focus to the topography of the infection [40]. This proposed classification criterion relies on the use of imaging techniques to localize the area of infection, assisting surgeons in selecting a more appropriate surgical treatment [40]. This area is still being investigated, but has the potential to offer targeted interventions and improve patient outcomes.

Cutaneous and systemic symptoms are not always present in PJIs, making it difficult for orthopedic surgeons to suspect it as a possible diagnosis [1]. However, when cutaneous symptoms like rubor, surgical wound secretions, and skin fistula formation are present, they are highly diagnostic of a PJI, especially when combined with systemic manifestations like sepsis or a fever [41]. Systemic manifestations alone do have some diagnostic significance, but since they are not always present, PJIs can sometimes go unnoticed [1]. The current clinical signs are categorized into acute and chronic manifestations, with a lack of emphasis on dermatological signs [42]. A PJI should be part of the differential in any patient experiencing pain in or around a prosthetic joint, even in the absence of other clinical symptoms, to reduce the risk of missing a PJI [42]. Due to the unpredictability of the clinical presentation, establishing a set of criteria necessary to confirm the diagnosis of PJI is challenging [42]. However, having a new criterion based on the common dermatologic manifestations of PJIs could lead to improved patient outcomes by facilitating early diagnoses.

CONCLUSION

This literature review highlights the complexities surrounding a periprosthetic joint infection (PJI) and the management approaches. Periprosthetic joint infections (PJIs) generally lead to poor patient outcomes and increased healthcare costs. The various associated symptom presentations of PJI can range from systemic to localized dermatologic manifestations. Therefore, early recognition of dermatological changes, such as erythema, swelling, and the formation of a sinus tract, can aid in a timely diagnosis. Many diagnostic criteria from the Musculoskeletal Infection Society (MSIS), International Consensus Meeting on Musculoskeletal Infection (ICM), and European Bone and Joint Infection Society (EBJIS) differ in their approach, which can further undermine the consistency in treatment strategies. Focusing on the dermatologic manifestations of PJIs may aid orthopedic surgeons in diagnosing PJIs more efficiently. However, this literature review did not identify specific dermatologic manifestations that can diagnose a PJI, except for a sinus tract communicating with the prosthesis, a pathognomonic sign of a PJI. Therefore, orthopedic surgeons must rely on other systemic symptoms and tests for a definitive diagnosis. Currently, the established criteria for PJI diagnosis have their own set of dermatologic findings, but having a universal set of cutaneous symptoms may improve the accuracy of diagnosis. By expediting the diagnostic workup for a PJI, clinicians have the greatest opportunity to maximize successful treatment outcomes with early intervention.

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CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest.

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