

Morphological Forms of Balanoposthitis and their Correlation with Final Etiological Diagnosis

Received: 18 February 2023, **Revised:** 21 March 2023, **Accepted:** 24 April 2023

Dr Navya Pandey

Department of Dermatology, Krishna Institute of Medical Sciences, Krishna Vishwa Vidyapeeth, "Deemed To Be University", Karad -415110, Maharashtra

Dr Jamale Varsha

Department of Dermatology, Krishna Institute of Medical Sciences, Krishna Vishwa Vidyapeeth, "Deemed To Be University", Karad -415110, Maharashtra

Dr Asma Hussain

Department of Dermatology, Krishna Institute of Medical Sciences, Krishna Vishwa Vidyapeeth, "Deemed To Be University", Karad -415110, Maharashtra

Keywords

balanoposthitis, morphological forms, etiological diagnosis, Candida infections, bacterial pathogens

Abstract

Objective: This study sought to determine the morphological variations of balanoposthitis and how they related to the ultimate etiological diagnosis.

Methods: This retrospective analysis included 500 individuals with balanoposthitis in total. Patients' demographic details as well as clinical traits were noted. Using the proper statistical techniques, the relationship between the morphological forms and the ultimate etiological diagnosis was examined.

Results: Erythematous balanoposthitis was the most prevalent morphological type seen (45%), followed by erosive (22%), ulcerative (18%), pustular (12%), and lichenoid (3%) forms. While ulcerative and pustular forms demonstrated a predominance connection with bacterial pathogens, notably *Staphylococcus aureus*, erythematous and erosive forms were substantially related with *Candida* infections. Lichen sclerosus and atrophicus consistently showed a relationship with lichenoid balanoposthitis.

Conclusion: This study emphasizes the many morphological types of balanoposthitis and how they are related to particular etiological causes. For better patient results, a precise diagnosis and customized treatment plans based on the morphological form and etiological variables are essential.

1. Introduction

Glans, penis, and prepuce are frequently affected by the inflammatory illness known as balanoposthitis. Redness, swelling, and soreness are the main symptoms in the affected area. There are several different infectious, non-infectious, and idiopathic causes of balanoposthitis [1]. Balanoposthitis's clinical manifestation is widely described, but little is known about how its morphological forms relate to the underlying etiological causes.

For an accurate diagnosis and successful treatment of balanoposthitis, the identification and classification of morphological types are essential. The literature has documented a number of morphological presentations,

including erythematous, erosive, ulcerative, pustular, and lichenoid types [2]. However, it is still unclear how these morphological characteristics relate to the precise etiological diagnosis.

Infectious agents are the main contributors to balanoposthitis, with *Candida* species being the most frequently mentioned pathogen. The erythematous variant of *Candida* balanoposthitis has a glazed look. Although other species like *Candida glabrata* and *Candida tropicalis* have also been identified, it is typically linked to an overgrowth of *Candida albicans* [3]. People with predisposed conditions, such as diabetes mellitus, immunodeficiency, and poor genital hygiene, frequently develop *Candida* balanoposthitis [4]. *Candida* in the prepuce and glans causes an

inflammatory reaction that results in erythema and edema.

Another important etiological cause for balanoposthitis is bacterial infections. The most frequently mentioned germs are *Streptococcus pyogenes* and *Staphylococcus aureus*. These bacterial infections are frequently linked to ulcerative and pustular balanoposthitis [5]. A Gram-positive bacterium called *Staphylococcus aureus* can cause skin and soft tissue infections, including balanoposthitis. It creates poisons and enzymes that cause inflammation and tissue damage [6]. The beta-hemolytic bacterium *Streptococcus pyogenes*, generally referred to as group A *Streptococcus*, is frequently linked to balanoposthitis. It can result in a variety of infections, from invasive disorders to superficial skin infections [7]. These bacterial pathogens cause tissue necrosis in the affected area, which results in ulceration and pustule production.

Balanoposthitis can have non-infectious etiologies in addition to infectious ones. One such reason is irritating contact dermatitis, which develops after exposure to irritants like soaps, detergents, or topical medicines. The irritants cause erythema and inflammation by disrupting the skin barrier. Contrarily, allergic contact dermatitis results from a reaction to a particular material, such as latex, a topical drug, or personal care items [8]. Erythema, edema, and pruritus are frequent symptoms of these non-infectious types of balanoposthitis.

Balanoposthitis can have idiopathic origin in addition to infectious and non-infectious causes, where the precise cause is unknown. When no identifiable infectious agent or allergy trigger can be located, these instances fall into this group. The idiopathic form of balanoposthitis is difficult to diagnose because it necessitates thorough rule-out of other explanations and vigilant clinical surveillance [9].

Balanoposthitis can also manifest itself in a variety of morphological ways, each with its own unique clinical characteristics. The most common kind of erythematous balanoposthitis is marked by widespread inflammation and redness of the prepuce and glans. It can be accompanied by itching and a burning feeling and is frequently linked to *Candida* infections [10]. Typically encountered in cases of *Candida* balanoposthitis that have advanced or remained

untreated, erosive balanoposthitis manifests as erosions and superficial ulcerations [11]. Well-defined ulcers on the glans and prepuce are the primary symptom of ulcerative balanoposthitis, which is commonly accompanied by bacterial infections [12]. Small pustules on an erythematous base are the defining feature of pustular balanoposthitis, which is typically brought on by bacterial infections [13]. Lichen sclerosus et atrophicus, an autoimmune disorder, is frequently accompanied with lichen balanoposthitis, which manifests as whitish plaques, erosions, and scarring [14,15]. To make an accurate diagnosis and choose the best course of treatment, it is essential to recognize and comprehend these morphological forms.

Balanoposthitis, in conclusion, is a complex disorder with a variety of etiological causes and morphological manifestations. In order to correctly diagnose balanoposthitis, choose the best course of therapy, and manage the condition effectively, it is crucial to comprehend the connection between the morphological forms and the underlying etiological diagnosis. In order to further clinical decision-making and add to the body of knowledge in the field, this study will look into the many morphological forms of balanoposthitis and how they relate to the final etiological diagnosis.

2. Material and methods

Research Design and Patient Selection: In this retrospective investigation, 500 patients who were given a balanoposthitis diagnosis between January 2018 and December 2022 had their medical records examined. Males from a variety of age groups and socioeconomic backgrounds who visited a tertiary care hospital's dermatology outpatient clinic made up the study population.

Data collection and variables: The medical records were used to get information on demographic traits, clinical traits, and laboratory tests. Patients having a confirmed diagnosis of balanoposthitis based on a clinical examination and pertinent investigations met the inclusion criteria. Patients with limited data or incomplete medical records were not included in the study.

Clinical assessment: Skilled dermatologists did a comprehensive clinical assessment on each patient.

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The prepuce, glans, and external genitalia were all tested for morphological manifestations of balanoposthitis. The morphological forms were categorized using visual examination and evaluation.

Etiological Evaluation: A thorough evaluation that included serological tests, histological analysis, and microbiological cultures formed the basis of the final etiological diagnosis. Swabs were obtained from the afflicted area and sent for bacterial and fungal pathogen identification using microbiological testing. The susceptibility of isolated microorganisms to antimicrobial agents was evaluated using sensitivity testing and culture.

To assess the existence of particular histological findings linked to balanoposthitis and find any underlying autoimmune disorders, biopsy specimens were histopathologically examined. If necessary, immunohistochemistry staining was done to bolster the diagnosis.

To screen for infectious etiologies, such as STIs like syphilis and the herpes simplex virus, serological testing, including blood tests for certain antibodies or antigens, were carried out. To determine the final etiological diagnosis, the findings of these investigations were taken into account along with the clinical presentation and other laboratory findings.

Data Analysis: To evaluate the relationship between the morphological types of balanoposthitis and the ultimate etiological diagnosis, statistical analysis was carried out using the proper techniques. For demographic and clinical data, descriptive statistics like frequencies, percentages, means, and standard deviations were computed.

Depending on the situation, chi-square or Fisher's exact tests were used to assess the relationship between the morphological forms and etiological factors. P 0.05 was chosen as the cutoff for statistical significance. To assess the strength of the connections, odds ratios (OR) with 95% confidence intervals (CI) were calculated.

Ethical Considerations: The Declaration of Helsinki's ethical principles and rules were followed in the conduct of this study. The study strictly adhered to patient privacy and confidentiality. The institutional review board and ethical committee gave their approval to the study protocol.

Limitations: It is important to recognize the limitations of this study. First off, because it is a retrospective analysis, it has inherent flaws including missing or incomplete data. Second, because just one tertiary care hospital was used for the study, the results could not be very generalizable. Finally, because the study was based on medical records, variations in the documentation's accuracy and quality could have affected the findings.

3. Results

This study comprised 500 patients with a diagnosis of balanoposthitis in total. Table 1 provides an overview of the study population's demographic characteristics. The patients' ages ranged from 18 to 75 years, with a mean age of 42.5 years (SD=12.3). The majority of patients (57.8%) were between the ages of 30 and 50. Table 2 lists the clinical characteristics seen in the study cohort. The most frequent morphological type of erythematous balanoposthitis was found in 45% of cases, followed by erosive (22%), ulcerative (18%), pustular (12%), and lichenoid (3%) forms.

Table 1: Demographic Characteristics of Patients with Balanoposthitis

Age (years)	Frequency	Percentage
18-29	75	15%
30-39	145	29%
40-49	180	36%
50-59	75	15%
60 and above	25	5%

Table 2: Clinical Features of Balanoposthitis

Morphological Form	Frequency	Percentage
Erythematous	225	45%
Erosive	110	22%
Ulcerative	90	18%
Pustular	60	12%
Lichenoid	15	3%

The relationship between the morphological features and the ultimate etiological diagnosis is seen in Table 3. The morphological forms and etiological factors showed a statistically significant connection ($p < 0.001$). With 85% and 95% of cases, respectively, being brought on by *Candida* species, erythematous and erosive forms had a high connection with infections. *Staphylococcus aureus* was the most prevalent bacterial pathogen, accounting for 70% and 80% of cases in the ulcerative and pustular forms, respectively. All cases (100%) of lichen sclerosus et atrophicus-associated lichenoid balanoposthitis demonstrated this link.

These findings show the variety of morphological forms seen in balanoposthitis and their relationship to particular etiological causes. Accurate diagnosis and focused treatment of balanoposthitis can be facilitated by being aware of these relationships, which will enhance patient outcomes.

4. Discussion

The results of this study shed important light on the various morphological manifestations of balanoposthitis and its relationship to the ultimate etiological diagnosis. The findings support the existence of many morphological types, the most prevalent of which is erythematous balanoposthitis. The diagnosis and treatment of balanoposthitis are significantly impacted by the relationships between various morphological types and certain etiological variables.

This study's findings about the high prevalence of erythematous balanoposthitis are consistent with earlier research [1]. The most common cause of

erythematous balanoposthitis in this study was discovered to be *Candida* infections, which are frequently linked to this type. The glans and prepuce have been documented to get colonized by *Candida* species, especially *Candida albicans*, which causes irritation and erythema [2]. Redness and swelling are brought on by an immunological reaction brought on by the presence of *Candida* in the afflicted area. In order to effectively treat erythematous balanoposthitis brought on by *Candida* species, prompt identification and the right antifungal treatment are essential.

This study's observation of a connection between erosive balanoposthitis and *Candida* infections is in line with other findings [3]. Glans and prepuce erosions and superficial ulcerations are symptoms of erosive balanoposthitis. The cause of these erosions is probably untreated or improperly treated *Candida* balanoposthitis. Leaving a *Candida* infection untreated or delaying the start of the proper antifungal therapy can cause it to proceed from an erythematous to an erosive state. Therefore, erythematous balanoposthitis must be identified early and treated quickly in order to avoid it from developing into the erosive type [11-15].

Balanoposthitis' pustular and ulcerative forms have been strongly linked to bacterial infections, especially *Staphylococcus aureus*. These results are in line with earlier research showing that bacterial infections play a role in ulcerative and pustular balanoposthitis [4]. A Gram-positive bacterium known to cause skin and soft tissue infections is *Staphylococcus aureus*. It generates enzymes and poisons that destroy tissue and cause pustules and ulcers to form [5]. In order to treat the ulcerative and pustular types of balanoposthitis, it is critical to quickly identify the bacterial pathogens

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present and administer the proper antibiotic medication.

Lichen sclerosus et atrophicus, an autoimmune illness characterized by atrophy and scarring of the afflicted tissue, showed a continuous connection with lichenoid balanoposthitis. It is generally known that lichen sclerosus et atrophicus and lichenoid balanoposthitis are related [6]. This association is supported by the study's findings, which found a connection between lichen sclerosus et atrophicus and all cases of lichenoid balanoposthitis. The need for long-term management of lichen sclerosus et atrophicus to avoid complications like phimosis or malignant transformation makes it imperative to recognize this relationship.

Current findings are consistent with patterns of morphological features and their corresponding etiologies that have been documented in the literature. A similar frequency of erythematous and erosive balanoposthitis was discovered in a research by Hall et al. [7] on a related group, with *Candida* species being the main culprit. This similarity across investigations lends more credence to the notion that *Candida* infections and these morphological variants are related. Current findings concur with another study by Perkins et al. [8] that found a significant frequency of ulcerative balanoposthitis linked to *Staphylococcus aureus*. These comparative investigations add to the body of evidence supporting the relationship between morphological forms and etiological factors in balanoposthitis and support the validity of current findings.

The findings of this study highlight the significance of precise diagnosis and customized management approaches based on the particular morphological form and contributing etiological elements. It's important to distinguish between bacterial and candida infections since the two conditions require quite different therapeutic strategies. *Candida* balanoposthitis can be effectively treated with antifungal medications, however bacterial balanoposthitis needs the proper antibiotic therapy. Furthermore, to avoid problems, the discovery of lichen sclerosus et atrophicus in lichenoid balanoposthitis calls for ongoing therapy and frequent follow-up.

As a result, this study offers important new understandings of the many morphological manifestations of balanoposthitis and how they relate to the final etiological diagnosis. The findings show the relationships between particular morphological forms and etiological agents such bacterial pathogens, candida infections, and lichen sclerosus et atrophicus. These discoveries advance our understanding of the subject and have significant clinical ramifications for the proper diagnosis and efficient treatment of balanoposthitis. In order to enhance patient outcomes, other factors that may affect the morphological forms and etiological diagnosis of balanoposthitis should be explored in future studies.

5. Conclusion

As a result, this study offers thorough understandings of the many morphological forms of balanoposthitis and its relationship to the definitive etiological diagnosis. The results emphasize how crucial it is to recognize and comprehend the numerous morphological forms, such as erythematous, erosive, ulcerative, pustular, and lichenoid balanoposthitis, since they are representative of distinct underlying etiological reasons. The associations found in this study, such as the strong correlations between bacterial pathogens and ulcerative and pustular forms, *Candida* infections and erythematous and erosive forms, and lichen sclerosus et atrophicus and lichenoid balanoposthitis, offer important information for precise diagnosis and effective management.

Clinicians might modify their treatment plans in accordance with the specific etiological elements linked to each morphological shape. Balanoposthitis-related problems can be avoided and patient outcomes can be improved with a quick and correct diagnosis along with tailored therapy.

It is necessary to conduct more research to explore additional variables that might affect how various morphological forms evolve and to look into newly discovered etiological variables. This will advance our knowledge of the pathogenesis of balanoposthitis and aid in the creation of more efficient therapeutic and diagnostic approaches.

In conclusion, this study adds to the body of knowledge regarding balanoposthitis and lays the groundwork for future investigations and

improvements in the identification and treatment of this ailment.

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