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Review Article

Severe Bacterial Balanitis in Circumcised Adult Males

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Abstract: Balanitis is the inflammation of the glans penis while balanoposthitis involves both the glans penis and prepuce and occurs only in uncircumcised males. Balanitis is more common in uncircumcised males due to the occlusive effect of the foreskin, which facilitates smegma retention and bacterial and fungal overgrowth. Therefore, balanitis is rare after circumcision and severe balanitis is even rarer. In patients with recurrent balanoposthitis, circumcision is indicated, and the presence of diabetes should be ruled out. Diabetes mellitus is a frequent predisposing factor for Candida balanoposthitis and has been associated with male genital lichen sclerosus, which in progressive stages leads to phimosis. Circumcision is also indicated in the treatment of lichen sclerosus associated with phimosis. *Candida albicans* stands as the primary culprit in cases of acute infectious balanoposthitis, with aerobic bacteria constituting the second most common etiological factor. Among these bacteria, streptococci particularly groups B and D and staphylococci, notably *S. aureus*, are prevalent. Mixed infections may also occur. The typical clinical manifestations involve erythema and oedema accompanied by itching and/or pain. In instances of painful, erosive streptococcal balanoposthitis, severe balanopreputial oedema with purulent exudate can be observed. *Staphylococcus haemolyticus*, a prominent member of the coagulase-negative staphylococci of the skin microbiota, causes infections in the male urogenital tract, such as urinary tract infections, chronic prostatitis and epididymo-orchitis. However, it had not been associated with balanitis. *Enterococcus faecalis* is part of the normal gastrointestinal microflora and is also a frequent cause of urinary tract infections and of chronic prostatitis. *Enterococcus* has been associated with mild balanoposthitis in adults and *E. faecalis* has been described to cause balanoposthitis in young children, but its association with severe balanitis in circumcised adults had not been reported. We comment the case of a healthy, non-diabetic, circumcised adult male patient with severe, erosive, and painful balanitis due to *S. haemolyticus* and another case of severe, extensive, and painful balanitis due to *E. faecalis* in a diabetic, circumcised adult male. In both cases, the fungal culture on Sabouraud dextrose agar was negative.

Keywords: Balanitis, Balanoposthitis, Circumcision, Coagulase-negative staphylococci, *Staphylococcus haemolyticus*, Enterococci, *Enterococcus faecalis*.

INTRODUCTION

Balanitis describes to inflammation of the glans penis, while posthitis refers to inflammation of the prepuce. Balanoposthitis is the inflammation that affects both the glans penis and prepuce (Perkins OS *et al.*, 2023). However, the terms balanitis and balanoposthitis are often used interchangeably. It affects up to 12% to 20% of paediatric and adult males (Wray AA *et al.*, 2023).

Men with balanitis usually present with penile itching or pain and erythema. In balanoposthitis, pain, tenderness or itching associated with erythema and oedema of the glans and/or foreskin is observed; there may also be exudate and discharge (Perkins OS *et al.*, 2023).

LITERATURE REVIEW

Balanitis occurs in less than 5% of circumcised males (Jegadish N *et al.*, 2021). Balanitis is more common in uncircumcised males due to the occlusive effect of the foreskin, which facilitates poor hygiene and smegma retention. This creates a nidus for bacterial and fungal overgrowth (Wray AA *et al.*, 2023). Therefore, circumcision is considered a surgical procedure that prevents penile infectious dermatoses, with or without accompanying phimosis (Morris BJ *et al.*, 2017).

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Balanoposthitis and balanitis also are more common in diabetic patients regardless of circumcision status (Perkins OS *et al.*, 2023). Candida balanoposthitis is much more frequent in diabetic patients. In patients with recurrent balanoposthitis, fasting plasma glucose should be investigated for diabetes screening (Wray AA *et al.*, 2023).

Diabetes has also been associated with genital lichen sclerosus in adults, which in advanced stages may present with phimosis (Hofer MD *et al.*, 2014). Therefore, fasting plasma glucose and glycated haemoglobin testing for diabetes is recommended for all patients with lichen sclerosus. In addition, infectious balanoposthitis is common in patients with lichen sclerosus and non-retractile foreskin (Lisboa C *et al.*, 2009). Circumcision is the treatment of choice for established phimosis associated with lichen sclerosus of the penis, allowing, in addition, to confirm its histological diagnosis (Morris BJ *et al*., 2017).

Balanoposthitis can be categorized into acute and chronic forms, with infectious balanoposthitis being the most common among acute conditions. Fungal infections, particularly those caused by *Candida albicans*, predominate as the primary culprits for acute balanoposthitis, followed by aerobic bacterial infections (Lisboa C *et al.*, 2009). Various etiological agents may contribute, with non-infectious factors including fixed drug reactions, trauma, irritation, or contact. Chronic balanitis is often linked to inflammatory dermatoses or neoplastic conditions (Mazuecos-Blanca J *et al.*, 2023).

Candida albicans emerges as the main cause of infectious balanoposthitis, especially among diabetic patients. In bacterial balanoposthitis, streptococci (groups B and D and staphylococci, particularly *Staphylococcus aureus*, are the most prevalent causes (Lisboa C *et al.*, 2009). Coagulase-negative staphylococci (CoNS), such as *Staphylococcus epidermidis* (Deepa K *et al.*, 2019) and *Staphylococcus warneri* (Li M *et al.*, 2021), have also been associated with balanoposthitis. Although most studies involve uncircumcised patients (Perkins *et al.*, 2023, Wray AA *et al.*, 2023), there have been reports of severe bacterial balanitis caused by other gram-positive cocci in circumcised adult patients (Mazuecos-Blanca J *et al.*, 2023, Mazuecos-Gutiérrez JR *et al.*, 2023).

The European guideline for treating balanoposthitis highlights streptococci and *S. aureus* as the main aerobic bacteria causing balanitis, though other organisms may be involved without specifying the species. The guideline notes that clinical manifestations typically include inflammatory changes such as varying degrees of erythema and oedema. Treatment is usually topical, but severe cases may necessitate systemic antibiotics based on the susceptibilities of the isolated organism (Edwards SK *et al.*, 2023).

Balanitis due to aerobic bacteria would not be considered a sexually transmitted infection, although they can be transmitted to a sexual partner. Balanoposthitis caused by group A streptococci (GAS), or Viridans Group Streptococci (VGS) can occur through oral sex (Norimatsu Y *et al.*, 2020, Roy P *et al.*, 2016). Balanoposthitis has been described in children and adolescents without sexual practices due to *Streptococcus pyogenes* by contamination or autoinoculation of a perianal dermatitis or acute pharyngitis (Fernández-Cuesta Valcarce MA *et al.*, 2020).

Acute erosive and painful balanoposthitis is typical of streptococcal infections. There is intense oedema with purulent exudate (Chaine B *et al.*, 2014). However, circumcision of patients should make balanitis more difficult (Mazuecos-Blanca J *et al.*, 2023). Patients with genital herpes may also present with erosive ulcers with circular or polycyclic borders.

CoNS are skin commensal bacteria but can also be pathogens of the genitourinary tract. *Staphylococcus haemolyticus* is one of the skin microbiota CoNS that also colonizes the surfaces of the external genitalia, causing urinary tract infections (UTI) in both genders (Eltwisy HO *et al.*, 2022). It had also been associated with chronic bacterial prostatitis (Ebrahimpour S *et al.*, 2017) and epididymo-orchitis (Pindar C *et al.*, 2018), but not with balanitis (Mazuecos-Blanca J *et al.*, 2023).

We encountered a situation involving a healthy adult male who underwent circumcision eight months prior to address recurring episodes of balanoposthitis endured over three years. The individual presented with painful, erosive, and exudative balanitis attributed to *Staphylococcus haemolyticus*. Notably, he reported no urinary discomfort or inguinal lymphadenopathy, and his wife did not exhibit any genital symptoms (Mazuecos-Blanca J *et al.*, 2023).

From vaginal or anal intercourse, *S. haemolyticus* would ascend through the urethra and urinary bladder to the upper organs causing chronic prostatitis and epididymo-orchitis (Ebrahimpour S *et al.*, 2017, Pindar C *et al.*, 2018); in our case, it only infected the patient's external genitalia (Mazuecos-Blanca J *et al.*, 2023).

The second case was a well-controlled diabetic male on metformin treatment who was diagnosed with severe phimosis that made it difficult for him to retract his foreskin, for which reason he underwent circumcision. The pathological diagnosis of the surgical specimen was lichen sclerosus. Two months after the postectomy, he developed extensive balanitis with diffuse erythema of the glans and shaft of the penis, pain and itching due to *Enterococcus faecalis*. He also had no urinary discomfort or inguinal lymphadenopathy (Mazuecos-Gutiérrez JR *et al.*, 2023). *E. faecalis* is

associated with aerobic vaginitis, but the patient did not declare sexual intercourse with his wife since the onset of phimosis, so we assumed that there was previous genital colonization by this enterococcus species. However, balanitis has a worse clinical presentation in diabetic patients (Morris BJ *et al.*, 2017).

Enterococci are facultative anaerobic gram-positive bacteria that frequently colonize the human gastrointestinal tract. The most relevant species are *Enterococcus faecalis* and *Enterococcus faecium*. *E. faecalis* is usually sensitive to ampicillin, its treatment of choice, and responded well in our case. However, *E. faecium* is usually resistant to ampicillin and its treatment of choice is vancomycin (Calderón-Parra J *et al.*, 2022).

Enterococcus faecalis is a causative pathogen of UTI in both genders and chronic prostatitis (Calderón-Parra J *et al.*, 2022). Some bacteria, such as *Enterococcus*, in addition to *Staphylococcus epidermidis*, *Klebsiella* or *Escherichia coli*, have been reported to cause mild balanoposthitis (Lisboa C *et al.*, 2009). *Enterococcus faecalis* has been associated with balanitis in young children, aged 3 to 6 years (Fernández-Cuesta Valcarce MA *et al.*, 2020). However, we had not found references to the development of such extensive balanitis in a circumcised adult patient due to *E. faecalis* (Mazuecos-Gutiérrez JR *et al.*, 2023).

Because the clinical appearance of balanitis is usually nonspecific, treatment of infectious balanoposthitis should be based on isolation of the etiologic organism (Lisboa C *et al.*, 2009). Therefore, we believe that *S. haemolyticus* and *E. faecalis* are the causative agents of the patients' infections. According to antimicrobial susceptibility testing, there was a good response to oral and topical antimicrobial treatments administered in our two patients. In both cases, the fungal culture on Sabouraud dextrose agar was negative.

Systematic treatment of sexual partners is not necessary in candida balanoposthitis but can be administered in group A streptococcal balanoposthitis acquired by oral sex (Edwards SK *et al.*, 2023). In our cases, the sexual partners were also not treated.

CONCLUSION

In conclusion, balanitis in circumcised patients is rare and severe balanitis is even rarer, which may be facilitated by the existence of diabetes mellitus. We have observed a case of severe, erosive, and painful balanitis due to *Staphylococcus haemolyticus* in a nondiabetic, circumcised patient, and another case of severe, diffuse erythematous, and painful balanitis due to *Enterococcus faecalis* in a well-controlled diabetic and circumcised patient.

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