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Review

Study on various types of infections related to balanitis in circumcised or uncircumcised male and its causes, symptoms and management

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Balanitis generally affects uncircumcised males characterized by the glans and foreskin becoming red and inflamed. In circumcised men, who lack a foreskin, these symptoms only affect the tip of the penis. The condition often occurs due to the fungus *Candida albicans*, the same organism that causes vaginal yeast infections in women. The objective of the study is to give a study on various types of infections related to balanitis in circumcised or uncircumcised male and its causes, symptoms and management. A data search was performed using the OVID CD plus Medline 1990 to 2010, using balanitis and balanoposthitis as text word search strategy. Specific subjects, such as anaerobic infection, Zoon's balanitis were sought separately and subgroups combined. Original articles and abstracts were referenced to illustrate each condition. These were English language articles. Balanitis is a common condition among genitourinary medicine clinic attendees, the cause often remaining undiagnosed. Many cases are caused by infection, with *Candida* being the most frequently diagnosed. However, *Gardnerella* and anaerobic infections are common, and there are a wide variety of other rare infective causes. In addition, irritant balanitis is probably a contributing factor in many cases. Balanitis which persists and in which the cause remains unclear warrants biopsy.

Key words: Balanitis, circumcision, infections.

INTRODUCTION

Balanitis generally affects uncircumcised males, characterized by the glans and foreskin becoming red and inflamed. In circumcised men, who lack a foreskin, these symptoms only affect the tip of the penis. The condition often occurs due to the fungus *Candida albicans*, the same organism that causes vaginal yeast infections in women. Balanitis (which is also referred to as balanoposthitis) can also be caused by a variety of other fungal or bacterial infections, or may occur due to a sensitivity reaction to common chemical agent. Diabetes can increase the chances of getting balanitis, especially if the blood sugar is poorly controlled. High blood sugar causes elevated amounts of sugar in the urine. Other symptoms include white clumpy or yellowish discharge from the affected skin or from under the foreskin. Treatment depends on the cause. If the problem is caused by a yeast infection, an antifungal cream will be recommended. If an infection has occurred with skin bacteria, an antibacterial cream will be suggested. When the skin is inflamed, but not infected, the physician will advise to keep the area clean and free from soaps or any other irritants like lotions. Balanitis can occur at any age, but the prevalence of specific etiologies is age dependent. In the United States (US), balanitis accounts for approximately 11% of men seen in urology clinics. Approximately 3% of uncircumcised men are affected globally. Balanitis appears to be more common in US men of African American and Hispanic descent; although, this may relate to differences in circumcision rate among

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Table 1. Range of factors causing balanitis.

Infectious	Skin disorder	Miscellaneous
Candida albicans	Circinate balanitis	Trauma
Trichomonas vaginalis	Lichen sclerosus (balanitis xerotica obliterans)	Poor hygiene
Gardnerella vaginalis	Zoon's balanitis	Irritant
Staphylococcus aureus	Erythroplasia of Queyrat	Contact allergy
Entamoeba histolytica	Pemphigus	Fixed drug eruption
Anaerobes	Lichen planus	
Mycobacteria	Bowen's disease	
Streptococci (Group A and B)	Psoriasis	
Syphilis		
Herpes simplex		
Human papillomavirus		

American men (Leber, 2008).

CAUSES AND SYMPTOMS

While balanitis can be caused by almost any chemical or bacterial irritant; the most common source of balanitis is yeast called *C. albicans*. Other causes of balanitis include an extra-long foreskin; foreskin which cannot be retracted behind the head of the penis (phimosis), poor hygiene, venereal diseases, trauma, the use of strong soaps and incontinence. Diabetics, uncircumcised men, men who do not practice safe sex and men who suffer from incontinence are at a greater risk for developing balanitis. Various range of factors causing balanitis are given in Table 1. The most common symptoms are pain, swelling, weeping and redness in the foreskin. Clinical features and complications are given in Table 2.

INFECTIONS

Fungal infection

Candidal balanitis, this is considered to be the most common cause of balanitis and is due to infection with candidal species, usually *C. albicans* (Figure 1). It is generally sexually acquired, although carriage of yeasts on the penis is common. Being 14 to 18% with no significant differences between carriages rate in circumcised or uncircumcised men (Boon, 1990). Symptomatic infection is more common in the uncircumcised male. Significantly, more of the female partners of men carrying yeasts were found to have candidal infection (Davidson, 1991). Diagnosis may be on the clinical appearances alone, microscopy and/or culture. The sensitivity of microscopy varies with method of sampling, and an "adhesive tape" method has proven to be more accurate than swabbing (Dockerty and Sonnex, 1995). Infection may occur without sexual contact, usually in the presence of diabetes, of which it may be the presenting symptom, or after the use of oral antibiotics (Waugh et al., 1992). Symptoms are of burning and itching of the penis with generalized erythema of the glans and/or prepuce which may have a dry glazed appearance, with eroded white papules and white discharge (Waugh, 1993). In diabetic patients, the presentation may be more severe with edema and fissuring of the fore skin, which may become non-retractile (Waugh et al., 1992).

Anaerobic infection

The presence of anaerobes on the glans penis (Figure 2), particularly in the uncircumcised male has been associated with non-specific urethritis (NSU) and balanitis (Oates, 1996). In this study, anaerobes were isolated in only 21% of healthy controls, but in 76% with balanoposthitis and 67% with NSU, whilst in those with both NSU and balanitis, 95% had anaerobic bacteria, *Bacteroides* species being the most common. The predominance of *Bacteroides* strains in anaerobic balanitis has been found by others, in a study of 104 patients with balanoposthitis, anaerobes were isolated in 29 cases (Corbus and Harris, 1990). Most of these were mixed infections, but the commonest isolates were *Bacteroides melaninogenicus* (19 specimens) and other *Bacteroides* spp. (27 specimens). A severe erosive and gangrenous form of anaerobic balanitis (the fourth venereal disease of Corbus) has been recognized for many years with the presence of anaerobes and *Fusobacterium* species. Anaerobes do not appear to cause genital ulceration, but are found in genital ulcers of any aetiology, and in this situation the predominant strains are *Bacteroides assacharolyticus* and *Bacteroides ureolyticus*. The features of anaerobic balanitis are superficial erosions, foul smelling sub preputial discharge, preputial edema and in guinaladenitis. More minor forms also occur. Resolution is normally rapid with

Table 2. Clinical features and complications.

Clinical features				Complications
Symptoms		Signs		
Presenting symptoms	**Associated symptoms**	**Genital**	**General**	
Local rash - may be scaly or ulcerated	Rash elsewhere on the body	Erythema	Lymphadenopathy (local or general)	Phimosis
Soreness	Sore mouth	Ulceration	Non-genital rash	Meatal stenosis
Itch	Joint pains	Exudate	Oral ulceration	Malignant transformation
Inability to retract the foreskin	Swollen / painful glands	Oedema	Arthritis	
Discharge from the glans / behind the foreskin	General malaise	Leukoplakia		

metronidazole treatment.

Aerobic infection

G. vaginalis in unselected men and the prevalence rate of *G. vaginalis* isolation is 7.2 to 8.0% with a significantly higher isolation rate in men with balanoposthitis ($P < 0.001$). The prevalence of *G. vaginalis* in non-candidal balanoposthitis is 31% and concomitant anaerobic infection is common (75% co-isolation of *Bacteroides*). It is likely to be sexually acquired and partners of women with *G. vaginalis* have high isolation rates from the urethra or urine (Pheifer et al., 1998). Sub preputial carriage in consorts of women with *G. vaginalis* has not been studied specifically. The symptoms of pure *G. vaginalis* balanitis are milder than those in anaerobic infection with irritation of the prepuce and glans penis, macular erythema and a fishy sub preputial discharge. As co-infection with anaerobes is common, this may represent the milder end of a spectrum of disease.

Streptococci

Group B streptococci can be carried asymptomatically in adult genital tract, but are strongly associated with balanitis (Deliyanni et al., 1998). Rate of carriage varies between heterosexuals and homosexuals (16.6% in heterosexuals and 39.3% in homosexuals) although no balanitis occurred in the latter group. Sexual transmission is unclear as there was no expected age differential in one study; while in another, meatal carriage was not proportional to promiscuity. The clinical appearance is of nonspecific erythema with or without exudate, but more rarely may extend to penile cellulitis if abrasions are present (Corbus and Harris, 1990). Group A hemolytic streptococci have also been reported as causing balanitis. Most reports are of uncircumcised children who are presented with erythematous and moist balanitis, where the mode of transmission appears to be autoinoculation from other sites. Pyoderma of the penis following fellatio has been reported, and in this case group A, hemolytic streptococci were isolated from the coronal sulcus (Deliyanni et al., 1998).

Mycobacterial infection

Tuberculosis Scandinavian data suggest that genitourinary tuberculosis remains stable in western countries, despite a fall in the prevalence of pulmonary tuberculosis (Stevanovic, 1998). However, balanitis remains an uncommon presentation in Europe and the United States, but is common in Japan and countries where there is a high prevalence of tuberculosis. It presents as a chronic papular eruption of the glans penis, which may be ulcerated and heals with scarring. It is associated with a positive Mantoux test and histology shows tuberculoid granuloma formation with a characteristic absence of tubercle bacilli. Penis tuberculides are thought to be due to the haematogenous spread of infection, and respond well to anti-tuberculous chemotherapy. Leprosy involvement of the glans penis has been reported in leprosy alone and in association with penis tuberculides.

Protozoal infection

Trichomonas can cause a sexually acquired superficial erosive balanitis which may lead to phimosis (Powers et al., 1992). There is a strong association with the presence of other infections. Histology of the lesions shows dense lymphocytic infiltration in the upper dermis. The organism may be demonstrated in a wet preparation from the sub preputial sac. This condition responds well to treatment with metronidazole.

Figure 1. Candidal balanitis.

Figure 2. Anaerobes on the glans penis.

Entamoeba histolytica cutaneous amoebiasis of the genitalia occurs occasionally, and amoebic balanitis has been reported amongst uncircumcised men in New Guinea. It causes edema of the prepuce with phimosis and discharge and in these cases, circumcision is helpful (Pheifer et al., 1998; Deliyanni et al., 1998; Stevanovic, 1998; Thomas and Antony, 1996; Powers et al., 1992).

Despite rectal carriage of amoeba by homosexuals, balanitis is rarely seen in Europe, but the high prevalence in New Guinea is thought to be due to sodomy (Thomas and Antony, 1996).

Spirochaetal infection

Syphilitic balanitis

Multiple circinate lesions which erode to cause irregular ulcers have been described in the late primary or early secondary stage. A primary chancre may also be present. Spirochaetes are easily identified from the lesions.

Non-syphilitic spirochaetes

Ulcerative balanitis has been associated with infection by non-syphilitic treponemes of the borrelia group, and spirochaetes have been observed on dark field microscopy. This often coexists with other genital infection, and has been reported from Africa and India. In a study, by Powers et al., (1992) fusiform bacteria and spirochaetes were seen in 51% of men and were associated with balanitis in the presence of pyogenic organisms (Powers et al., 1992).

Viral infection

Herpes simplex

In rare cases, primary herpes can cause a necrotizing balanitis with necrotic areas on the glans accompanied by vesicles elsewhere and associated with headache and malaise. This has been reported with herpes simplex virus types 1 and 2.

Human papillomavirus (HPV)

Papillomavirus may be associated with a patchy or chronic balanitis which becomes acetowhite after the application of 5% acetic acid. Acetowhite change has also been reported in non-HPV associated balanitis and has been resolved on treatment. HPV was identified in two studies-in the first in 56% of patient samples (of which 54% were oncogenic types) but only 26% of controls and the other revealed HPV6 in 4 out of 5 cases (Stuhmer, 1998).

Balanitis xerotica obliterans

This is a descriptive term for a chronic scarring balanitis (Figure 3) which was first described by Stuhmer, and

Figure 3. Balanitis xerotica obliterans.

which is most commonly caused by Lichen sclerosus et atrophicus. Other causes are rare and include pemphigus vulgaris and chronic nonspecific bacterial balanitis.

Lichen sclerosus and atrophicus

The association between balanitis xerotica obliterans and Lichen sclerosus et atrophicus was made by Laymon and Freeman (1944), who described five patients with skin lesions as well as genital involvement. The main symptoms are pain, irritation, disturbance of sexual function or urinary symptoms (including obstruction). Rarely, this can be present as a recurrent bullous balanitis, with the development of painful blisters and ulceration which may be precipitated by local trauma. The clinical appearance is of white plaques on the glans, often with involvement of the prepuce which becomes thickened and non-retractile. In active disease, haemorrhagic vesicles may be seen. The changes only affect squamous skin, leaving atrophic areas which cause cicatritial shrinkage leading to urethral stenosis and phimosis.

The condition affects all ages and circumcision specimens from children with phimosis often show the characteristic histological appearances. Histology initially shows a thickened epidermis, followed by atrophy and follicular hyperkeratosis. This overlies an area of oedema with loss of the elastic fibres and alteration in the collagen, which in turn overlies a perivascular band of lymphocytic infiltration. Haemorrhagic vesicles occur when the oedema causes detachment of the epidermis with capillary erosion and extravasation of blood. The sometimes arrest, the areas of atrophy do not regress. Development of squamous cell carcinoma has been reported in patients with balanitis xerotica obliterans, both in areas of active and quiescent disease, but malignant change appears to be less common than in Lichen sclerosus et atrophicus in the female.

Pemphigus

This autoimmune bullous disorder may cause balanitis. Pemphigus vulgaris can cause the clinical picture of balanitis xerotica obliterans and pemphigus vegetans; a rare variant is manifest by vegetating plaques. These usually occur in intertriginous areas, but may affect the glans penis (Chalmers et al., 1994).

Zoon's (plasma cell) balanitis

Zoon's (plasma cell) balanitis was first described by Zoon in 1952 and is a main differential diagnosis with Erythroplasia of Queyrat. The lesions are well circumscribed and orange-red in colour with a characteristic glazed appearance and multiple pinpoint redder spots-"cayenne pepper spots". Symptoms of pain, irritation and discharge occur. Histological appearances are also characteristic with epidermal atrophy, loss of rete ridges, "lozenge keratinocytes" and spongiosis. A predominantly plasmacytic nature of the infiltrate is found subepidermally, which helps to differentiate this condition from others in which there is a non-specific plasma cell infiltrate. The aetiology is unknown although chronic infection with *Mycobacterium smegmatis* has been proposed as a cause. The course is chronic and poorly responsive to topical treatment, but it can be resolved completely on circumcision (Murray et al., 1996).

Erythroplasia of Queyrat

This is a manifestation of carcinoma *in situ* which was described by Queyrat in 1911. It has a characteristic red, velvety appearance with sharp margins, and a granular surface, usually occurring in the uncircumcised male over 40 years of age. The lesions may be single or multiple, and if keratotic or indurated suggest the development of frank squamous cell carcinoma.

Pseudoepitheliomatous, micaceous and keratotic balanitis

This rare condition of the glans penis was first described by Lortat-Jacob and Civatte (1961). The course is progressive initially causing phimosis, then the development

development of a tumour with a verrucous appearance, and a well demarcated white keratotic layer which covers the glans. Histologically, the lesions show a hyperplastic, keratotic epidermis with a polymorphonuclear infiltrate. Although, originally considered to be benign, case reports suggest that the lesion may be locally invasive, or synonymous with verrucous carcinoma (Beljaards et al., 1997).

Circinate balanitis

Circinate balanitis is the commonest mucocutaneous manifestation of sexually acquired Reiter's syndrome; it occurs in 20 to 40% of cases. The incidence in enteric Reiter's disease is lower, and has only been noted in *Shigella* associated disease. It appears as greyish white areas on the glans which coalesce to form larger "geographic" areas with a white margin. The histology shows spongiform pustules in the upper epidermis with parakeratosis, acanthosis and elongation of rete ridges. Dermal capillaries are enlarged and increased numbers are present together with a mononuclear cell infiltrate, and some evidence of extravasation. These changes are similar to those of pustular psoriasis. Circinate balanitis may occur with or without other features of Reiter's syndrome in one series 9 out of 17 patients had balanitis alone, although the association with human leukocyte antigen (HLA 27) occurred in 15 of the 17 patients (Hindson, 1996).

Fixed drug eruptions

Fixed drug eruptions have a predilection for the glans penis, and are commonly related to therapy with antibiotics, especially tetracyclines and sulphonamides. Other causes include salicyclates, phenacetin, phenolphthalein and some hypnotics; although, there are case reports of other less common causative agents. Lesions are usually well demarcated erythematous areas which may be bullous and subsequently ulcerated. This can occur on the first exposure to a drug and repeated exposure will precipitate new lesions at the initial site (this can confirm the diagnosis). However, tetracycline induced eruptions may not recur on challenge with doxycycline. Most lesions will fade spontaneously without treatment, but may leave an area of residual hyper-pigmentation. Occasionally, treatment with topical, or rarely, systemic steroids may be required (Hindson, 1996).

Irritant and allergic balanitides

Many balanitides are non-specific and no etiological agent can be found. It has been suggested that these are often due to irritation, particularly if symptoms are persistent or recurrent. In one study of patients with persistent or recurrent problems, 72% were diagnosed as irritant balanitis, and this was associated with a history of atopy and more frequent genital washing with soap. Other series have found higher rates of infective agents; although, a large proportion of cases in one study remained undiagnosed. It is likely that irritation plays some part in other balanitides. More severe reactions have been seen with topical agents, some of which may have been used for treatment. Dequalinium is known to cause a necrotic balanitis, while titanium (that was previously thought to be biologically inert) may rarely cause a granulomatous balanitis. Balanitis as an allergic reaction is very uncommon; rubber and its constituents are the most frequently described allergens, although allergies to spermicidal lubricants are also well described. There is a wide spectrum of clinical manifestations varying from balanitis to edema of the whole penis extending to the groins. Treatment will depend on the severity of the reaction, but patch testing and avoidance of the precipitant is required (Chalmers et al., 1994).

Long term complications

Repeated inflammation can produce scars and make the opening of the penis smaller. It can also make it painful to put the foreskin back in its normal position after it has been pulled back. That can lead to injury to the penis. In rare cases, symptoms of cancer of the penis include redness, swelling and pain. A pre-cancerous condition called Erythroplasia of Queyrat has bright red, well-defined painless bumps on the head of the penis. A biopsy must be performed if cancer is suspected.

DIAGNOSIS AND MANAGEMENT

Balanitis is a descriptive term covering a variety of unrelated conditions, the appearances of which may be pathognomonic. Descriptions of the typical appearances of certain balanitides are given separately in the management part. The following investigations are intended to aid diagnosis in cases of uncertainty. Subpreputial swab for *Candida* and bacterial culture should be undertaken in most cases to exclude an infective cause or super infection of a skin lesion. Urinalysis for glucose appropriate in most cases, but especially if *Candida* infection is suspected. Culture for Herpes simplex if ulceration is present. Dark ground examination for spirochaetes and syphilis serology if an ulcer is present. Culture for *T. vaginalis*, particularly if a female partner has an undiagnosed vaginal discharge. Screening for other sexually transmitted infections (STIs), particularly screening for *Chlamydia trachomatis* infection/nonspecific urethritis if a circinate-type balanitis is present. Biopsy, if the diagnosis is uncertain and the

condition persists (Arumainayagam and Sumathipala, 1990).

Balanitis is a clinical diagnosis and covers a range of heterogenous conditions. The recommendations for management are therefore given on an individual basis.

General recommendation

1. Saline bathing with a weak salt solution twice daily while symptoms persist.
2. Avoid soaps while inflammation is present (Hillman et al., 1990)
3. Advise about effect on condoms if creams are being applied.
4. Patients should be given a detailed explanation of their condition with particular emphasis on the long-term implications for their health (and that of their partner where a sexually transmissible agent is found) (Birley et al., 1993).

Candidal balanitis

Candidal balanitis can be diagnosed with symptoms like erythematous rash with soreness and/or itch. Appearance will be blotchy erythema with small papules which may be eroded or dry dull red areas with a glazed appearance. Sub-preputial culture can be done. For treatment, the recommended regimens are clotrimazole cream 1% and miconazole cream 2% (Stary et al., 1996). These can be applied twice daily until symptoms have settled. Alternative regimens are fluconazole 150 mg stat orally if symptoms severe. Nystatin cream 100000 units/g, if resistance suspected, or allergy to imidazoles (Forster and Harris, 1996). Topical imidazole with 1% hydrocortisone if marked inflammation is present. There is a high rate of candidal infection in sexual partners who should be offered screening. Follow up is not required unless symptoms and signs are particularly severe or an underlying problem is suspected.

Anaerobic infection

Anaerobic infection can be diagnosed with symptoms like foul smelling discharge, swelling and inflamed glands. Appearance will have preputial oedema, superficial erosions, inguinal adenitis. Milder forms also occur. Sub-preputial culture can be done to exclude other causes. The recommended regimen is Metronidazole 400mg twice daily x 1 week. The optimum dosage schedule for treatment is unknown. Alternative regimen is, co-amoxiclav 375 mg three times daily × 1 week. Clindamycin cream applied twice daily until resolved. These treatments have not been assessed in clinical trials (Ewart et al., 1992).

Aerobic infection

Aerobic infection can be diagnosed by doing sub-preputial culture. Streptococci group A, *Staphylococcus aureus* and *G. vaginalis* have all been reported as causing balanitis. Other organisms (Herpes simplex, *T. vaginalis* and Syphilis) may also be involved. Diagnosis and treatment for these are as per specific guidelines. For Staphylococcus and Streptococci spp. treatment, it depends on the sensitivities of the organism isolated (Dahlman-Ghozlan et al., 1999).

Balanitis xerotica obliterans (Lichen sclerosus and Lichen sclerosus and atrophicus)

Balanitis xerotica obliterans can be diagnosed by the typical appearances which are, white plaques on the glans, often with involvement of the prepuce. There may be haemorrhagic vesicles, and rarely blisters and ulceration. The prepuce may become phimotic, and the meatus may be thickened and narrowed. A biopsy initially shows a thickened epidermis which then becomes atrophic with follicular hyperkeratosis. This overlies edema and loss of the elastin fibers, with an underlying perivascular lymphocytic infiltrate. Biopsy is the definitive diagnostic procedure. The recommended regimens are potent topical steroids (e.g. clobetasol proprionate or betamethasone valerate) applied once daily until remission, then gradually reduced. Intermittent use (e.g. once weekly) may be required to maintain remission (Liatsikos et al., 1997). Alternative treatments are circumcision if phimosis develops. Surgery for meatal stenosis (meatoplasty, urethroplasty or laser vaporization) has been used. These procedures may be required for specific complications, but treatment of the underlying skin disease will still be required. Patients requiring potent topical steroids for disease control should be followed up regularly. The frequency of follow up will depend on the disease activity and symptoms of the patient, but all patients should be reviewed by a doctor at least annually in view of the small risk (less than 1%) of malignant transformation (Bernstein et al., 1996). In addition, patients should be advised to contact the general practitioner or clinic if the appearances change.

Zoon's (plasma cell) balanitis

Zoon's balanitis can be diagnosed by typical appearance which is, well circumscribed orange-red glazed areas on the glans with multiple pinpoint redder spots "cayenne pepper spots". This may be similar to Erythroplasia of Queyrat which is premalignant and biopsy is advisable. In this, biopsy will reveal epidermal atrophy, loss of rete ridges, lozenge keratinocytes and spongiosis, together with a predominantly plasma cell infiltrate sub epidermally.

The recommended regimens are circumcision; this has been reported to lead to the resolution of lesions (Kumar et al., 1995). Topical steroid preparations with or without added antibacterial agents e.g. trimovate cream, applied once or twice daily (Oates, 1990). There is no evidence on effectiveness. CO_2 laser has been used to treat individual lesions (Boon, 1998). For follow up, it dependents on clinical course and treatment used, especially if topical steroids are being used long term. In cases of diagnostic uncertainty, penile biopsy should be performed prior to discontinuing follow up to exclude Erythroplasia of Queyrat.

Erythroplasia of Queyrat

Erythroplasia of Queyrat can be diagnosed by the typical appearance: red, velvety and well circumscribed area on the glans may have raised white areas, but if indurated suggests frank squamous cell carcinoma (Mikhail, 1990). The recommended treatment regimen is surgical excision. Local excision is usually adequate and effective. Alternative regimens are fluorouracil cream 5%, laser resection and cryotherapy. Follow up is obligatory because of the possibility of recurrence and to minimize annual appointments.

Other premalignant conditions

Bowen's disease

This is also cutaneous carcinoma *in situ* and is present as a scaly, discrete and erythematous plaque. Up to 20% will develop into frank squamous carcinoma. Biopsy is essential (Sonnex et al., 1992). Treatment is by local simple excision, although fluorouracil cream and laser resection have been used. Follow up is essential.

Bowenoid papulosis

Another form of carcinoma *in situ*, this is linked to HPV infection particularly with type. Lesions range from discrete papules to plaques. Treatment options include local excision and laser ablation, but some lesions will regress spontaneously. The premalignant conditions form a continuum with penile intraepithelial neoplasia (PIN), but vary in clinical presentation and natural history (Goette et al., 1995).

Circinate balanitis

Circinate balanitis can be diagnosed by typical appearance: greyish white areas on the glans which coalesce to form "geographical" areas with a white margin margin. It may be associated with other features of Reiter's syndrome, but can occur without also. A biopsy will reveal spongiform pustules in the upper epidermis, similar to pustular psoriasis. The recommended regimen is, hydrocortisone cream 1% applied twice daily for symptomatic relief (Sonnex et al., 1992). Alternative regimens are in some cases, treatment may not be required. More potent topical steroids may be required in some cases. If a sexually transmitted infection is diagnosed, the partner(s) should be treated as per the appropriate protocol. Follow up may be needed for persistent symptomatic lesions (Schellhammer et al., 1992).

Fixed drug eruptions

This can be diagnosed by typical appearance, but lesions are usually well demarcated and erythematous, but can be bullous with subsequent ulceration. A drug history is essential, since it is a history of previous reactions. Common precipitants include tetracyclines, salicylates, phenacetin, phenolphthalein and some hypnotics. Re-challenge can confirm the diagnosis. Treatment is not essential. Occasionally, topical steroids are needed e.g. 1% hydrocortisone applied twice daily until resolution (Braun-Falco et al., 1991). Rarely systemic steroids may be required if the lesions are severe. A follow up is not required after resolution. Patients should be advised to avoid the precipitant.

Irritant/allergic balanitides

Irritant balanitides can be diagnosed by typical appearance. Appearances range from mild erythema to widespread edema of the penis. Symptoms have been associated with a history of atopy or more frequent genital washing with soap. In a very small number of cases a history of a precipitant may be obtained. Patch test is useful in the small minority in whom true allergy is suspected. Biopsy may show non-specific inflammation. Recommended regimens are; avoidance of precipitants, especially soaps (Edwards, 1996). Emollients aqueous cream: applied as required and used as a soap substitute. Hydrocortisone 1% applied once or twice daily until resolution of symptoms. Follow up is not required, although recurrent problems are common and the patients need to be informed of this. A range of other skin conditions may affect the glans penis. These include psoriasis, lichen planus, seborrheic dermatitis, pemphigus and dermatitis artefacta (Mallon et al., 2000).

FINDINGS

The foreskin typically extends about 1 cm beyond the

glans and provides protection to the urethral meatus and glans penis. At birth, almost all male infants do not have a retractable foreskin because of the normal circumferential adhesions between the foreskin and the glans penis. After birth, penile growth and physiologic erection aid in the desquamation process that loosens the adhesions and leads to progressive foreskin retraction. Phimosis is an inability to retract the foreskin (prepuce) and is divided in two forms. Physiologically, due to the normal congenital adhesions between the foreskin and glans seen in almost all normal male newborn infants. This condition normally resolves throughout childhood with an incidence of about 1% in 7th grade boys. Pathologically, due to scarring of the foreskin leading to a true non-retractable foreskin.

The following are the routine care needed for the uncircumcised penis. The penis should be washed routinely during the normal bathing of any male infant or boy. Avoid forcible retraction. As the foreskin naturally begins to retract, cleaning and then drying underneath the foreskin can be performed. The foreskin should always be pulled down to its normal position covering the glans after drying. In any child who is not toilet-trained, frequent diaper changes to prevent diaper rash and foreskin/urethra irritation. During routine well-child visits, inclusion of a voiding history to uncover any urinary stream abnormality is necessary. Benign conditions seen in uncircumcised males include physiologic phimosis, preputial cysts due to smegma, and transient ballooning of the foreskin that resolves without manual pressure. It should be reassured that these are normal variations/findings that generally do not need any intervention.

Conclusions

Balanitis is a common condition among genitourinary medicine clinic attendees, the cause often remaining undiagnosed. Many cases are caused by infection, with *Candida* being the most frequently diagnosed. However, *Gardnerella* and anaerobic infections are common, and there are a wide variety of other rarer infective causes. In addition, irritant balanitis is probably a contributing factor in many cases. Balanitis which persists and in which the cause remains unclear warrants biopsy. Balanitis xerotica obliterans has been associated with additional genital abnormalities, including phimosis and squamous cell carcinoma. Neonatal circumcision reduces its occurrence. Pseudoepitheliomatous, keratotic, and micaceous balanitis (PKMB), although once considered benign, are now regarded as a tumor with malignant potential. Its poor response to conservative therapy and malignant potential emphasizes the importance of aggressive therapy. In addition, the considerable overlap between PKMB and verrucous carcinoma stress the importance of close clinical surveillance of the patients with repeat with repeat biopsy to ensure the early diagnosis of malignant change. Dermatology clinicians should recognize this rare lesion and appreciate its association with penile neoplasms.

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