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Review Article

A Practical Approach to Managing Phimosis Secondary to Balanitis Xerotica Obliterans

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Abstract

Background: Phimosis is a common presentation within the general practice setting and is often caused by Balanitis Xerotica Obliterans (BXO). Early intervention may stop development of phimosis and minimize urinary and sexual dysfunction.

Objectives: This review article provides an overview of the pathophysiology, clinical assessment and management strategies for BXO. A practical set of evidence-based recommendations relevant to general practice are highlighted.

Discussion: Malignant and infective causes should be excluded with appropriate referral to urology if warranted. Conservative measures include penile hygiene, topical steroid therapy and a foreskin stretching device. Second line therapies may include topical calcineurin inhibitors or retinoids treatments. Surgical management is primarily accomplished with circumcision and frenuloplasty (foreskin preserving), with glans, penile or urethral reconstruction with grafting in advanced cases.

Introduction

Phimosis is a common condition within the general practice setting. It's defined as the inability to retract the foreskin over the glans penis due to a narrow ring at the foreskin[1]. A "physiological phimosis" in children is due to adhesions between the prepuce and glans which separate gradually with growth, without significant adverse effects [1,2]. Pathological phimosis can have many aetiologies, with Lichen Sclerosis (LS) representing up to 15% of all cases in children, and up to 40% in older males [3-5]. Penile LS is also known as Balanitis Xerotica Obliterans (BXO) when it affects the foreskin and glans penis [6]. It is a severe and chronic dermatosis characterized by lymphocyte-mediated sclerotic, inflammatory and pruritic lesions, with subsequent fibrosis [6,7]. It can lead to phimosis, meatal stenosis, urethral stricture disease and an increased risk of malignant transformation to penile squamous cell carcinoma if untreated [8,9]. Prevalence is underestimated, with 43% (range 10%-87%) of <18-year-olds affected [10], causing morbidity at all ages. This article aims to provide an overview of the current understanding and management for phimosis/BXO. Relevant clinical guidelines are summarized, and we make a practical set of recommendations applicable to the general practice setting.

Aetiology and Pathophysiology

BXO aetiology is multifactorial and often linked to uncircumcised or late circumcised males [6,11]. The penile foreskin accumulates epithelial debris and secretions in the skin fold proximal to the coronal sulcus. This causes chronic irritation, chronic balanitis, mechanical microtrauma or a chemical reaction from urine pooling. This leads to the Koebner phenomenon, in which uninvolved skin subjected to cutaneous trauma activates a pre-existing skin condition in the affected area [6,11]. Risk factors include a genetic predisposition, obesity, diabetes, coronary artery disease, smoking and hypertension [12-14]. Autoimmunity is closely linked to BXO, with links drawn between alopecia areata, diabetes mellitus, Hashimoto's thyroiditis, localised scleroderma,

vitiligo and pernicious anaemia [15,16]. At the cellular level, T cell-mediated cytokine release causes abnormal, increased collagen production with sclerosing fibrosis and scarring [6,17]. Ultimately, distal scarring of the penis occurs, represented by a fibrotic circumferential band. Phimotic lesions can invade the external urethral meatus, navicular fossa, and distal urethra to cause stricture and in severe cases, may progress to involve the proximal urethra if left untreated [18]. The glans and foreskin are involved in 57% of patients, whilst the urethra and meatus may only be involved in 20% and 4% of patients respectively [19]. The frenulum and penile shaft may also be involved [6].

Clinical Assessment

Malignant or infective causes must be considered and excluded. Sexually Transmitted Infection (STI) screening is important in sexually active adults, and biopsy may be considered to exclude malignancy such as carcinoma-in-situ or penile squamous cell carcinoma [17]. Urgent referral to a urologist is suggested if there are concerns of malignancy, such as bleeding, ulceration, nodules, blistering or lymphadenopathy. If there are concerns of meatal involvement, urgent urological input is recommended to prevent progression to stricture disease. Differentials are listed in Table 1 [17].

Infectious	Malignant	Inflammatory	Autoimmune
• Fungal balanitis	• Carcinoma in situ	• Zoon's balanitis/plasma cell balanitis	• Psoriasis
• Bacterial balanitis	• Early squamous cell carcinoma	• Radiation dermatitis	• Scleroderma
• Syphilis	• Penile intraepithelial neoplasia	• Contact dermatitis	• Atopic dermatitis
• Cellulitis	• Penile cancer (squamous, verrucous, fibrosarcoma)	• Drug reaction	
	• Leukoplakia		

Table 1: Differential diagnosis of BXO.

History

The spectrum of disease is wide, and a range of presenting complaints may prompt patients to seek medical expertise. This is commonly asymptomatic. Loss of function – either voiding or sexual – can be the most alarming concern for the patient, impacting emotional and mental well-being. These are listed in Table 2 [6,17].

• Discoloration of the glans penis, foreskin, coronal sulcus
• Dysuria
• Voiding dysfunction
• Narrowed or deviated urinary stream
• Urinary tract infections
• Balanitis
• Buried penis
• Pain
• Painful erections
• Difficulty with erections, sexual intercourse
• Ballooning of the foreskin during voiding
• Glans or foreskin induration
• Dyspareunia
• Haemorrhage of affected areas
• Itching or burning of affected areas

Table 2: Common presenting complaints.

Sexual history is suggested to identify high-risk individuals for STI. Typically, history involves a dappled area which progresses to loss of elasticity, becoming brittle and tender [20]. There are usually periods of quiescence. Extragenital manifestations may involve the buttocks, mouth, neck, shoulders, thighs and back [17], which can be concurrent presenting concerns.

Examination

Examination of the anogenital region and penis are essential. Extragenital manifestation sites may be considered. Initial findings are subtle, non-specific erythematous or hypopigmented macules or papules. These coalesce into ivory, white or purple-white atrophic plaques with well-defined margins [6]. The most common examination findings are white hypopigmented lesions, atrophic plaques or scarring of the glans, penis or foreskin. A white, sclerotic ring around the tip of the foreskin is classically diagnostic, with or without meatal involvement. Phimosis and meatal stenosis are late-stage manifestations, as the glans forms adhesions to the prepuce with fibrotic replacement of the coronal sulcus and frenulum [6,17]. Table 3 include possible examination findings [6,17].

• Telangiectasia or purpura of the glans penis
• White discoloration of the glans penis, foreskin, coronal sulcus
• Red/erythematous discoloration of the glans penis, foreskin, coronal sulcus
• Scarring of the glans penis, penis, foreskin
• Phimosis/paraphimosis
• Meatal stenosis
• Sclerotic plaques at the buttocks, mouth, neck, shoulders, thigh and back

Table 3: Common examination findings.

Laboratory Testing

Appropriate STI screening should be conducted if one suspects an STI. Syphilis serology, and urinalysis for chlamydia and gonorrhea can be considered. Human papillomavirus is also responsible for 52% to 64% of childhood LS [7], so genital swabs can help. Literature has suggested the frequency of hypothyroidism or hyperthyroidism occurs at double the incidence of the general population in BXO patients [16], so thyroid function testing and antithyroid antibody levels can be considered. Punch biopsy is helpful for diagnostic accuracy if presentation is atypical. The British Association of Dermatologists have suggested pigmented lesions, atypical clinical features, extragenital LS, and suspicion of neoplastic changes as indications for biopsy [21]. In patients presenting with voiding dysfunction, bladder outlet obstruction must be considered and evaluated with urine microscopy, ultrasound imaging of the upper tracts and bladder and IPSS [22].

Conservative Management

Penile hygiene is advocated in the first instance. It should be stressed to patients (or parents/caregivers) that forced retraction of physiological phimosis can lead to scar formation, causing secondary pathological phimosis [23]. Once the foreskin is retractable, regular cleaning during bathing to prevent smegma build up is suggested [23], reducing the risk of chemical and physical irritation. Medical comorbidities such as obesity, diabetes mellitus, coronary artery disease, smoking, hypertension should be optimized. Steroids are a mainstay of treatment for mild to moderate BXO. Topical agents are first-line, however there is no consensus regarding the type of preparation, dosage, frequency and duration of use [7]. There is an acknowledged risk of skin atrophy, superinfection, hypopigmentation, irritation and rarely suppression of the hypothalamic-pituitary axis with prolonged use [24]. Oral corticosteroids have no role in BXO management [6,17]. Within the paediatric population, once-to-twice daily applications of formulations for four-to-eight weeks, followed by a reduction in frequency to once-to-twice weekly use has been successful for phimosis [24]. Suitable agents include betamethasone diproprionate 0.05%, clobetasol propionate 0.05%, mometasone furoate 0.10% ointments [6,17,23-26]. Overall success ranges from 50-80% [26], with up to a 90% response rate in the first month27. Guidelines suggest a recurrence rate of 17%, and efficacy is reliant on compliance and correct application around the sclerotic ring under gentle retraction [7,23]. Maintenance therapy may be required to prevent flares due to the recalcitrant nature of disease [24]. There is limited data around the efficacy of topical steroids for the adult population. The electronic Therapeutic Guidelines recommend topical betamethasone diproprionate 0.05% or clobetasol proprionate as treatment [28], with previous studies citing safety in its use and an improvement in 41%-76% of cases [7,21,26]. Certainly, other steroid formulations and potency can be considered. Foreskin stretching devices are available if patients prefer a foreskin sparing approach, though guidelines around these devices have not been established. Novoglan is available in Australia, with a recent clinical trial demonstrating 90% efficacy and high satisfaction rates, reducing pain and discomfort during sexual activity in more than 60% [29]. It uses balloon dilatation twice a day for 30-minute periods to stretch the skin [29]. PhimoStop™ is another option, which a prospective trial has demonstrated more than 50% of patients achieving no indication for circumcision [30]. It uses a set of progressively larger silicone tubes to stretch the phimotic ring, applying gentle and constant-pressured dilation [30].

Surgical Management

Surgical management is definitive. Topical steroids pre-operatively may help the surgeon. Indications for surgery include topical therapy failure, symptoms inadequately relieved by medical management, and patient preference. Circumcision is curative for disease confined to the glans and foreskin as it removes the environment in which BXO can progress [31]. It can aid in function (voiding and intercourse), disease control and restore cosmesis. The frenulum is often contracted, so a frenuloplasty may also be performed to increase quality of life [6,7,17]. Penoscrotal disease may be excised or resurfaced with a split-thickness skin graft or local advancement flap in severe cases [32]. If there is meatal or urethral involvement, cystoscopy may reveal extent of disease, and treatment with a dilatation, meatotomy, urethrotomy, meatoplasty or urethroplasty with buccal mucosal graft may be performed [31]. Meatotomy for BXO is typically followed by a course of topical steroids to stop disease progression and prevent future local involvement [7,17]. All procedures require a period with a urethral catheter post-operatively. Aftercare for these patients often involve close surgical follow-up until healing is complete. Vigilance by the general practitioner is required around new urinary or sexual dysfunction, and symptom recurrence (Figure 1).

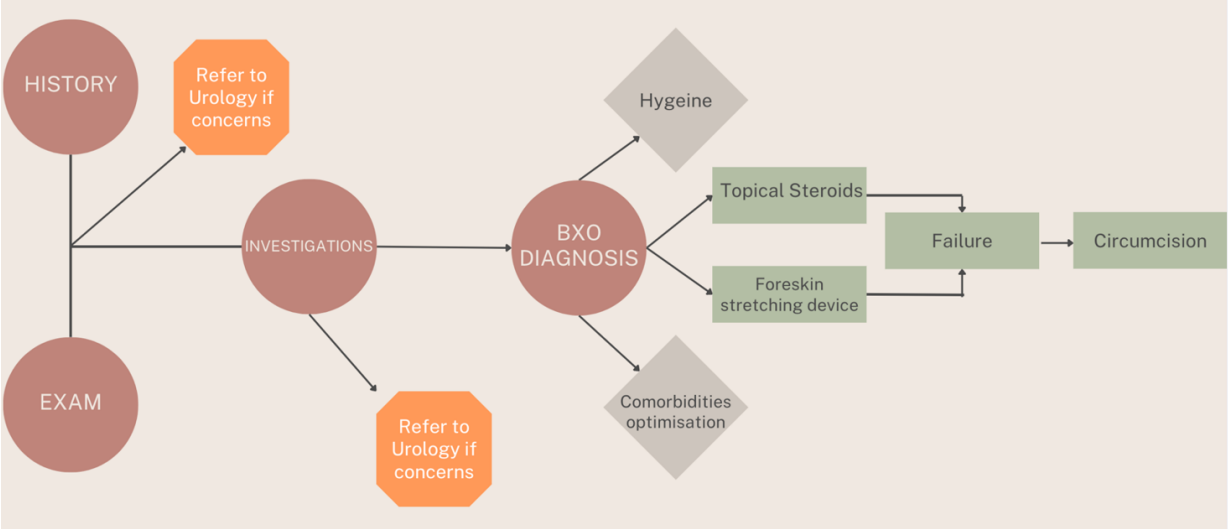

Figure 1: General management algorithm.

Conclusion

BXO is a common cause of phimosis. Late-stage BXO can be alarming, reducing quality of life and impacting mental and emotional well-being. Conservative and medical management can be initiated by the GP. Surgery for recurrent and severe disease requires specialist input.

Key Points

- BXO is a common cause of pathological phimosis.
- Aetiology is multifactorial and linked with late or uncircumcised males.
- Malignant or infective causes must be considered and excluded.
- First-line treatment involves hygiene, topical steroids or foreskin preservation devices.
- Circumcision is curative for foreskin/glans disease, and more complex surgeries may be required if there is meatal or urethral involvement.

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