Erectile dysfunction: An overview

Mike Callander

Erectile dysfunction (ED) has been defined as the persistent or recurrent inability to attain and maintain an erection sufficient to permit satisfactory sexual performance (NIH, 1993). A recent review of current epidemiological literature on ED suggests that ED is a frequent condition in men aged 40–70 years and the combined prevalence of minimal, moderate and complete ED is 52%, of which 5–15% of men have complete ED (Ayta et al, 1999). It is estimated that in 2025, the number of men worldwide with ED will rise to approximately 322 million (Ayta et al, 1999).

Erectile dysfunction (ED) can manifest as a partially rigid erection, the inability to maintain an erection, or the complete inability to achieve an erection. Penile erections are the result of a series of psychological, neurological, hormonal and haemodynamic events, and dysfunction in one or more of these systems can result in ED. Therefore, the aetiology of ED can be defined as being related to organic, psychogenic or mixed causes (Morgentaler, 1999). Erectile dysfunction can have profoundly negative effects on quality of life as well as interpersonal and marital relationships (Laumann et al, 1999). Increased interest in the pathophysiology of ED since the 1980s has led to the realisation that most cases are associated with an underlying organic cause. Symptoms of ED may be a marker for underlying cardiovascular or metabolic disease. Ageing and vascular disease are the most important risk factors for ED (Goldstein et al, 1998).

For sexual intercourse, the penis must be rigid enough to achieve penetration. This rigidity is made possible by the anatomy of the penis and a complex interplay of vascular and nervous system activity, physiology and biochemistry. During sexual arousal, the non-adrenergic, non-cholinergic system releases nitric oxide (NO) from the endothelium. This activates guanylate cyclase, which cleaves guanosine triphosphate to form cyclic guanosine monophosphate. This in turn causes a decrease in intracellular calcium, which promotes smooth muscle relaxation leading to tissue engorgement and penile erection. The enlargement of the penis is a result of an increased inflow of blood with restriction of outflowing veins. This results in an accumulation of blood inside the penis.

Risk factors

ED can be associated with cardiovascular disease and diabetes; the common aetiology is thought to be endothelial dysfunction. In a large study of over 27000 men with ED, only 10% had no co-morbidity. The co-morbidities found in the remaining 90% (Rosen et al, 2004) were:

- hypertension: 26%
- heart trouble or angina: 31%
- hypercholesterolaemia: 26%
- diabetes: 39%
- depression or anxiety: 26%.

Psychological and social impact

ED and loss of erection hardness may have an adverse effect on a man's psychological wellbeing. Loss of self esteem associated with ED can, in turn, have an impact on the relationship with their sexual partner resulting in a withdrawal from intimacy. Men with ED may be embarrassed by

Article points

1. Erectile dysfunction (ED) can manifest as a partially rigid erection, the inability to maintain an erection, or the complete inability to achieve an erection.
2. ED can be associated with cardiovascular disease and diabetes; the common aetiology is thought to be endothelial dysfunction.
3. ED and loss of erection hardness may have an adverse effect on a man's psychological wellbeing affecting sex life, relationship, self confidence, body image and self esteem.
4. It is important that men with ED seek medical intervention. Phosphodiesterase-5 inhibitors have a high success rate in improving sexual function.

Key words

- Erectile dysfunction
- Psychological and social impact
- Assessment
- Treatment

Mike Callander is a GP at Alliston Medical Centre, Manchester and is Chair of the Primary Care Sexual Dysfuction Society.

their condition, which could explain why only about 58% of men seek help (Rosen et al, 2004).

Patient attitudes

In a recent survey (Bayer Healthcare, 2007) conducted among 630 men with ED in April 2007, it was found that men with ED agreed it affects a number of areas of their lives, including:

- sex life: 93%
- relationship: 69%
- self confidence: 80%
- body image: 61%
- self esteem: 71%.

Previous research has highlighted that 54% of men with ED suffer from depressive symptoms (Shabsigh et al, 1998). The survey also found that men wait an average of 17 months before seeking treatment (Bayer Healthcare, 2007).

In total, 50% of respondents cited the occasional nature of the problem as the reason for delaying treatment, while 48% stated they ignored the problem (Shabsigh et al, 1998).

Importance of GPs in treating ED

Early identification and assessment of erectile function is important. ED may appear several years before the first symptom of coronary artery disease is identified – some maintain that ED should be considered a vascular disease until proved otherwise (Jackson et al, 2006). With the success rates of phosphodiesterase-5 (PDE5) inhibitors, primary care is the ideal setting to manage ED (visit the following for details of the three licensed in the UK: EMC, 2006a; EMC, 2006b; EMC, 2006c).

ED can have a profound adverse effect on men's psychological wellbeing. It causes loss of self esteem and sexual confidence and is also associated with depression (Steidle et al, 2006). Men frequently feel unable to discuss concerns about erection problems with their sexual partner. They are likely to see it as a shameful problem and will try to conceal it. Resulting negative behavioural changes are likely to have an adverse effect on the overall relationship, increasing their sense of isolation and psychological distress.

Depressive symptoms are common in men with ED (Shabbir et al, 2004). The choice of antidepressant therapy is important as many antidepressants cause sexual problems. In men with mild depressive symptoms related to ED, restoration of erections through treatment with a PDE5 inhibitor is a reasonable initial strategy. PDE5 inhibitors are effective in treating ED in men with depression (Nurnberg et al, 2002).

A perceived inability to satisfy a partner is an important contributor to the loss of self esteem that is so common in men with ED (Tomlinson and Wright, 2004). As a consequence of delaying seeking professional advice about the problem, relationship problems that may have resulted from ED are likely to be well established by the time a man receives treatment, perhaps reducing the likelihood of a successful treatment outcome. More than a fifth of men report that their relationship had ended as a result of their erection problem (Taylor AGB Healthcare, 1997).

Successful treatment of ED does improve men's self confidence and self esteem (Tomlinson and Wright, 2004). Better erectile function in men is associated with them experiencing significantly greater sexual satisfaction and an increased desire for physical acts that enhance basic intimacy as well as for sexual intercourse (Swierzewski et al, 2005). ED has an independent negative effect on the sexual satisfaction and sexual drive of female partners (Chevret et al, 2004), whereas effective treatment of ED has been shown to improve sexual function and satisfaction among female partners, which can lead to treatment-related improvement in the man's erectile function (Cayan et al, 2004; Fisher et al, 2005; Oberg and Sjögren Fugl-Meyer, 2005; Goldstein et al, 2005), thus improving sexual relationship satisfaction.

People may find it difficult to recommence sexual activity at their partner's urging if their relationship has deteriorated owing to ED. It is important for the health professional to assess partner and relationship factors as a routine part of ED assessment. When potential problems are identified, referral to a sexual and relationship therapist may help the couple re-establish intimacy in their relationship (Plaut et al, 2004).

At the same time, the loss of self esteem and associated feelings of inadequacy may have an impact on a man's day-to-day relationships with friends and work colleagues. Many men feel too embarrassed to confide in their male friends about their erectile problems and report feelings that they are the only ones affected by ED or are prematurely old. Their natural reluctance to seek medical advice about health problems in general means that they are unable to share their concerns about ED with their family doctor or specialist. This behaviour compounds their sense of inadequacy, feelings of isolation, and loss of confidence and self esteem. It would be wise for the practitioner to ask about sexual function in their male patients to identify if they are likely to be at risk of cardiovascular or metabolic disease.

ED and diabetes

ED is common in diabetes (Fedele et al, 1998; McCulloch et al, 1980) and may be the presenting symptom. The aetiology may be vascular disease, autonomic neuropathy, hypogonadism or a combination of these. Men with ED who fail to respond to PDE5 inhibitors have been shown to have low testosterone levels (Kalinchenko et al, 2003): it is being increasingly recognised that this is associated with reduced insulin sensitivity and type 2 diabetes (Kapoor et al, 2005; Oh et al, 2002; Stellato et al,

2000; Haffner et al, 1996). An inverse relationship exists between testosterone levels and insulin concentrations in healthy men (Simon et al, 1992). Testosterone levels are reported to be low in 33% of diabetic men (Dhindsa et al, 2004). In addition, testosterone-replacement therapy was found to convert sildenafil nonresponders to responders (Shabsigh et al, 2004; Aversa et al, 2003).

Visceral obesity is an important cause of insulin resistance. Free testosterone levels are low in obese men and inversely correlate with the degree of obesity (Zumoff et al, 1990; Haffner et al, 1993). There is increased deposition of abdominal adipose tissue in hypogonadal subjects, which leads to a further decrease in testosterone levels through conversion to estradiol by aromatase. This leads to further abdominal fat deposition and a greater degree of testosterone deficiency (Kapoor et al, 2005). The hypogonadal obesity cycle was first described by Cohen (1999).

Testosterone treatment has been shown to reduce insulin resistance in obese men (Marin et al, 1992a; Marin et al, 1992b), men with heart failure (Malkin et al, 2007) and men with type 2 diabetes (Kapoor et al, 2006). Studies have shown an improvement in glycemic control with testosterone-replacement therapy (Morgentaler, 1999; Moreland et al, 2001).

Assessment

Assessment involves a medical history, focused sexual history, drug review and physical examination.

The sexual history will usually differentiate between organic and psychogenic causes of ED. Pointers to psychogenic ED are sudden onset, the presence of morning erections and perhaps a situational aspect. Other questions should address erection hardness (Erection Assessment Scale 1–4; Goldstein et al, 1998) and the ability to attain and maintain an erection. Ejaculation problems should be assessed, as should libido and the nature of the relationship.

Useful leading questions are: 'When was your last satisfactory sexual intercourse?' and 'Does your partner know you are seeking treatment for your ED?'

Physical examination should asses the cardiovascular system and genitalia, with a digital rectal examination if the man is over 50 years of age. Mandatory investigations should include fasting blood sugar, fasting full-lipid profile and morning testosterone level between 8 and 10 am. Testing for PSA is recommended in men over 50 years of age.

Software has been developed by the author to capture all data and to calculate cardiovascular risk.

Treatment overview

Current recommendations for the treatment of ED focus on a stepladder approach. The management of the man with ED progresses from lifestyle changes to drug therapy, to minimally invasive vacuum devices or injection therapy, to more invasive prosthetic surgery. General recommendations are shown in *Box 1*.

Oral therapy

The most common first-line treatment is a PDE5 inhibitor as they are generally well tolerated and few men will discontinue treatment owing to adverse events. They are a class of agent that inhibit the isoform PDE5, which can be found in the cavernosal smooth muscle in the penis. Vardenafil, sildenafil and tadalafil have all been shown in randomised controlled trials to be effective in broad populations of men with varying ED aetiologies. All three PDE5 inhibitors demonstrated improvements in erectile function when compared with placebo (EMC, 2006a; EMC, 2006b; EMC, 2006c). A summary of treatments is shown in *Box 2*.

Patient's lifestyle

Whichever method is used to treat the individual, it is very important that they find a treatment that suits them. For example, the perceived needs of a person who is not in a steady relationship may be different from someone who has been married for 30 years or more. In many instances, the couple need to work together to resolve the problem. Therefore, the individual's lifestyle and persona should be taken into account prior to prescribing any treatment. ■

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Box 1. General recommendations.

- **Smoking cessation** – smoking increases the risk of ED by its effects on the vasculature; therefore, people should be encouraged and supported to stop smoking
- **Weight loss** – if the individual is overweight or obese
- **Reduced alcohol intake** – large amounts can cause sedation and decrease libido
- **Some prescription medications can contribute to ED** – a thorough medicines review should be conducted
- **Ensure good control for diabetes** – ED is three times more common in men with diabetes (Ayta et al, 1999). Diabetes may cause ED through its effects on the nerve function, vascular angiopathy, and endothelial and smooth muscle function. Testosterone levels can be lower in men with diabetes and this may be reflected in loss of libido (EMC, 2006c)

Box 2. ED treatment summary.

- **Vacuum erection device** – A cylinder is placed over the penis and a vacuum pump draws blood into the penis. An occlusive band is placed around the base of the penis to maintain the erection
- **Intraurethral MUSE (Medical Urethral System for Erection)** – The drug is injected intraurethrally through the external urethral meatus and is transferred from the urethra to the corpus spongiosum and then to the corpus cavernosum through venous channels
- **Intracavernosal injection therapy** – Direct intracavernosal injection of vasoactive agents generally provides rapid, reliable penis erections in all but the most severe cases of arterial insufficiency
- **Surgical treatment** – When corpora cavernosal tissue is no longer functional owing to replacement by a certain amount of fibrous tissue, the only solution for ED may be the implantation of a penile prosthesis. Rod and inflatable varieties are available

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