UNIT NO. 2

# DIAGNOSIS AND UNDERSTANDING OF ERECTILE DYSFUNCTION

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## 1. Definition of ED

Erectile dysfunction is defined as the inability to achieve and maintain an erection of sufficient rigidity for satisfactory sexual intercourse.

## 2. Incidence of ED

With the increased aging population, there is an increase in patients present with erectile dysfunction. In the Massachusetts Male Aging study, 52% of the general male population aged between 40 and 70 years reported some degree of ED. In Singapore, a community study on ED was done in 729 male subjects in all age group, 51.3% of those aged 30 and above reported some degree of erectile dysfunction. In addition, a sub-analysis of 460 men aged 40 to 69 gave a prevalence rate of 52.7%. This increased with age and it reached 90% in those 70 years and above. The problem is commoner in Indian race as compared to other races especially in those 50 years and above.

## 3. Patho-physiology of ED

Physiology of Normal Erectile Function

Penile erection is a complex neurovascular event involving the interaction of three physiological systems: the CNS, the peripheral nervous system, and penile arterial and trabecular smooth muscle. Penile tumescence and detumescence are haemodynamic events that are controlled by the nervous system.

a. *Central control of erectile function: Brain, brainstem and spinal cord*

The CNS integrates and coordinates incoming sensory information from the visual and auditory systems (via the occipital cortex) and cognitive/imaginative stimuli, along with tactile and olfactory sensory information. The structures underlying this information processing are incompletely understood, but strong evidence supports the involvement of regions within the hypothalamus, where the activation of dopamine receptors induced erection.

Areas of the medulla and pons integrate sensory information from the penis, and activate nervous outflow to the urogenital tract via the spinal cord and sympathetic nervous system. Pathways using 5-hydroxytryptamine (serotonin) appear to be important in this regard.

In general, the activation of parasympathetic nerves induces erection, while sympathetic nerves induce penile detumescence and terminate erection.

The thoracolumbar erection center is located in the spinal cord between T11 and L2 and gives rise to sympathetic pathways. The sacral erection centre is located between the S2 and S4 segments of the spinal cord and gives rise to autonomic pathways, which are mostly para-sympathetic, with fibres running to the penis via the pelvic nerve, pelvic plexus and cavernosal nerve, and via the pudendal nerve.

b. *Peripheral mechanisms of normal erectogenesis and detumescence (Fig 1)*

Relaxation of penile smooth muscle is necessary for erection, which allows blood to flow into the penile structures, resulting in increased cavernosal pressure. Resultant compression of the subtunical venules against the tunica albuginea, simultaneously reduces venous drainage from the corpora cavernosa. This dual effect increases pressure within the corpora, producing erection.

During detumescence, increased drainage via venous outflow channels decreases the intracavernosal pressure. The flaccid state of the penis is maintained by the contraction of penile smooth muscle caused by the intracellular accumulation of $Ca^{2+}$ ions, affected mainly by the stimulation of $a_1$-adrenergic receptors by noradrenaline.

## 4. Causes of ED

ED may have psychogenic or organic causes, in many patients the disorder is of mixed aetiology, with both factors present. The psychogenic component of ED is especially important in younger men. Common disease in the elderly e.g. diabetics and vascular disease, play an important part and more than half of men aged over 50 years have ED secondary to vascular disease. The causes of ED can be classified into the following causes and their approximate distribution shown:

1. Vascular

   Greater than 50% of men older than 50 have vascular disease as the cause of ED. Smoking, hyperlipidemia, obesity and diabetics are risk factors that would contribute to the development of ED

2. Neurogenic

   In any lesions that would affect the parasympathetic sacral spinal cord or the peripheral efferent autonomic fibers to the penis (post-surgery) cause partial or complete ED. Any lesion in the spinal cord, supraspinal lesion like strokes would also contribute to ED. This neurogenic cause represent about 15–20%

3. Hormonal

   This only contributes 5–10 % of the causes of ED. Any lesion that would affect the androgen whether by castration,

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aging, tumour (hyperprolactinemia), hypo or hyperthyroidism will cause ED

4. Medication
   The medication background of ED is quite significant. A lot of therapeutic medication will affect erectile function. The commonest include the anti-hypertensive medication, cimetidine, antipsychotic medication that would affect the central and peripheral noradrenergic and dopaminergic pathways will also affect erectile function to some extent
5. Anatomical
   Some of the anatomical abnormalities of the penis like pyronie disease will also cause ED
6. Psychogenic
   Any form of psychiatric illness will affect the erectile function. The younger the patient, the more important is the psychogenic origin of the ED in the aetiology.

Risk factors for ED

Although ED can strike at any age, older men are at increased risk because of the higher incidence of diabetes mellitus or hypertension. Other major risk factors include obesity, smoking and lack of exercise. The risk factors for the ED are shown in Table 1.

## 5. Diagnosis of ED

The diagnosis of ED should include an evaluation of the patient's medical and psychosexual history, a physical examination and selective investigations.

*a. Clinical Diagnosis*

Medical and psychosexual history

This is probably the most important aspect of the diagnostic process and allows the identification and differentiation of common risk factors for both organic and psychogenic ED.

The medical history should focus on identifying risk factors for organic ED. This usually involves determining patients' lifestyle habits, including smoking, alcohol consumption and drug use or abuse.

ED may be symptomatic of several conditions or chronic diseases which must be excluded, e.g. cardio-vascular disease, diabetes, neurological disorders or psychological illness. Prescription drugs are also an important consideration.

Validated sexual function questionnaires may be used to determine the nature and severity of the patient's sexual problem and assist in forming the correct diagnosis of organic or psychological ED. Among the more widely applicable assessment tools for the clinical assessment of ED currently available, the International Index of Erectile Function (IIEF). An abridged five-item version of the IIEF questionnaire focusing on erectile function and satisfaction with intercourse has been developed (IIEF-5) and validated.

Past and present sexual relationships should also be investigated, as well as any other emotional stressor such as employment history.

**Table 1. Risk Factors for the ED**

| Risk factor | Examples |
|---|---|
| Ageing | |
| Lifestyle | Cigarette smoking<br>Alcohol abuse<br>Lack of excise<br>Overweight |
| Endocrinopathies | Hypogonadism<br>Hyperprolactinaemia<br>Hypothyroidism<br>Hyperthyroidism |
| Psychological issues | Depression<br>Anxiety<br>Social factors |
| Chronic diseases | Diabetes mellitus<br>Cardiovascular<br>Hypertension<br>Vascular disease<br>Dyslipidaemia<br>Renal failure<br>Liver disease |
| Neurogenic causes | Spinal injury<br>Multiple sclerosis<br>Herniated disk<br>Demyelinating disease |
| Penile injury/disease | Peyronie's disease<br>Priapism<br>Anatomical defects |
| Medications | Alpha-blockers<br>Beta-blockers<br>Thiazides<br>Tricyclic antidepressants<br>Monoamine oxidase inhibitors<br>Specific serotonin re-uptake inhibitors<br>Antipsychotics<br>Anxiolytics<br>Anti-arrhythmics<br>Niacin<br>Phenytoin |

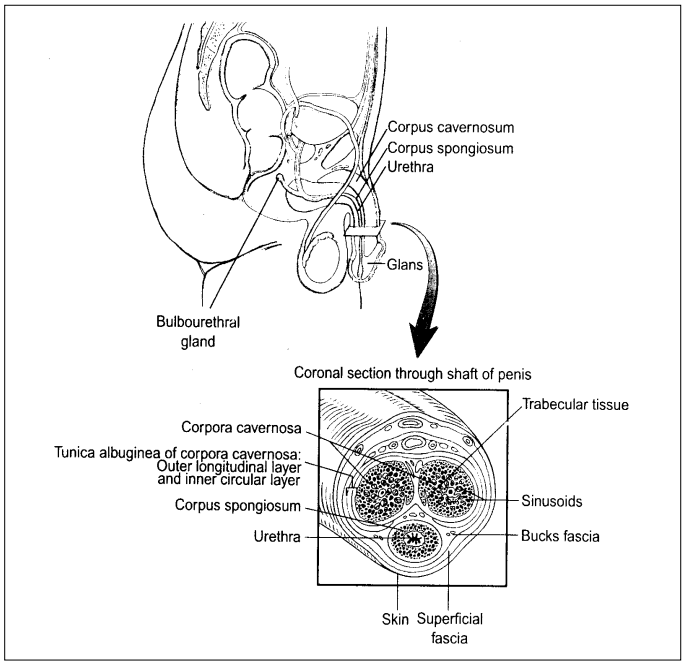


Fig 1. Anatomy of the erectie system

The diagnostic process always involves a general physical examination for clinical signs of several disorders, including hypertension, cardiovascular disease, renal or hepatic dysfunction. For younger patients, one may have to determine the presence of male sexual characteristics. Assessment of the major pulses is essential to exclude large-vessel disease such as Leriche syndrome and abdominal aortic aneurysm. Examination of the genital system, including a thorough palpation of penile, testicular and rectal areas, can assess the presence of congenital or acquired anatomical abnormalities of erectile structures or endocrinopathies.

*b. Investigations*

Laboratory testing may be used to provide additional diagnostic tools and confirm or exclude potential ED risk factors. Recommended diagnostic procedures for the evaluation of a patient presenting with ED by Singapore Urological Association is labstix or urinalysis for glycosuria. The optional tests include serum testosterone, prolactin, liver function tests, creatinine, lipid profile, full blood count and ECG. The other optional test is Doppler ultrasound of the penis and this is to determine the arterial and venous blood flow before and after the injection of PG E1 or self stimulation.

Pitfalls in Diagnosis

The diagnosis of ED is only dependent on patient's feedback on the medical, sexual, psychosocial and IIEF questionnaire. There is no reliable objective history to confirm the presence of ED and its severity. It is a very subjective evaluation and conclusion. In fact, it is usually not easy to determine the underlying causes of ED. There was combination of factors just like DM which could affect vascular and neurological factors. The same reasons are also applied in aging patients with many co-morbid factors. Nevertheless, with the emergence of new oral medication it may be no longer necessary to determine the actual causes of ED anymore as 60-84% of the patients will usually response to some extent.

**LEARNING POINTS**

- Erectile dysfunction is defined as the inability to achieve and maintain an erection of sufficient rigidity for satisfactory sexual intercourse
- Erectile dysfunction may have psychogenic or organic causes, in many patients the disorder is of mixed aetiology, with both factors present
- The assessment of the patient should include an evaluation of the patient's medical and psychosexual history, a physical examination and selective investigations
- The diagnosis of erectile dysfunction is subjective, depending largely on the patient's feedback on the medical, sexual, psychosocial and IIEF questionnaire. There is no reliable objective history to confirm the presence of erectile dysfunction and its severity
- With the emergence of new oral medication it may no longer be necessary to determine the actual causes of erectile dysfunction as 60-84% of the patients will usually respond to treatment.