

**AACE CLINICAL PRACTICE GUIDELINES
FOR THE EVALUATION AND TREATMENT
OF MALE SEXUAL DYSFUNCTION**

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MISSION STATEMENTS

Guidelines Mission Statement

The purpose of these guidelines is to present a framework for the evaluation, treatment, and follow-up of the patient—indeed, of the couple—who presents with sexual dysfunction. Although the focus is on male erectile dysfunction, the guidelines also discuss the other aspects of libido and ejaculatory difficulties that may be present as well and may share in the cause or consequences of the erectile problem. Erectile dysfunction is often compounded by sexual difficulties in the partner or relationship issues. Male sexual dysfunction should be viewed as a chronic disease with medical, psychologic, and behavioral components that must not be treated in a mechanical and purely medicinal manner. The patient and his sexual partner must be full and active participants in the process and in follow-up care. These guidelines address the complexity involved in diagnosing the various aspects of the disorder and offer an organized system of care for the couple. In this way, the outcome can be improved in a cost-effective manner. The American Association of Clinical Endocrinologists (AACE) believes that, although a multidisciplinary approach may be required in many cases, the clinical endocrinologist is the best trained to lead in the evaluation of the problem, to decide on multispecialty consultations, and to provide follow-up care.

Public Service Mission Statement

According to a recent survey, the Massachusetts Male Aging Study, 52% of men older than 40 years of age may have some degree of erectile failure. For a variety of reasons, only a small percentage of men seek medical help.

With a better understanding of the aging process, and especially the aging-related changes in sexual function, most older couples are still sexually active. Sexual frequency decreases with advancing age. Although modifications in sexual techniques may be necessary, the level of sexual satisfaction can remain high.

As men age, the free testosterone level declines approximately 1.2% per year and usually is associated with commensurate increases in serum luteinizing hormone (LH) levels. Some clinicians believe that age-appropriate but lowered levels of free testosterone (in comparison with those in young men) are not contributory to sexual dysfunction. Nevertheless, some clinical studies have substantiated positive responses to testosterone therapy in men with borderline low free testosterone levels.

Sexual dysfunction is related to much more than testosterone. An organized approach is necessary for each couple because the dropout rate for many treatment options exceeds 50%. A holistic approach is needed for evaluation of all risk factors involved. Decreased libido can accompany erectile dysfunction and is often either the cause or an effect. Libido problems may be related to hypogonadism, hyperprolactinemia, depression, fear of sexual failure, certain medications, or systemic illness. Ejaculatory difficulties can be either organic or psychogenic problems and are manifested by retarded ejaculation, anejaculation, or premature ejaculation. Medication effect and nerve damage are common organic causes. Relationship difficulties may affect the ejaculatory mechanism as well.

AACE has developed a systematic medical approach for assessment of each couple and all potential risk factors in the sexual relationship (see Appendix). This approach allows formulation of a plan to diagnose and treat the difficulty and achievement of a long-term correction. This outcome can be accomplished only with the continued cooperation of the endocrinologist and both partners.

The loss of erectile capacity is important to most men. Sexual function serves deeply felt, personal needs, reinforces the permanence of pair-bonding in couples, and aids in the stability of society in general. Sexual function can also be viewed as a status symbol and a psychological boost. Sexual dysfunction may cause substantial emotional concerns. With the man demonstrating age-related decreased sexual desire, and possibly function, the partner may have emotional concerns as well, manifested by doubts about attractiveness or questions about the man's faithfulness.

The aging man's sexual function is a quality-of-life issue. These guidelines will educate physicians about sexual dysfunction, enhance the care and management of patients, and thereby provide an important public service.

THE ROLE OF THE ENDOCRINOLOGIST IN TREATMENT OF MALE SEXUAL DYSFUNCTION

The endocrinologist is ideally positioned to evaluate, diagnose, and identify the full range of medical, physical, and psychiatric problems responsible for disrupting an individual man's sexual function. With the full diagnostic array outlined, the endocrinologist can offer a rational and comprehensive treatment plan tailored to each man's

needs and can maximize opportunities to restore normal male sexual function.

A man's sexual function is inextricably linked to his sexual body chemistry. The treatment of erectile dysfunction can best be managed by those who understand man's body chemistry, particularly his sexual body chemistry.

Endocrinologists are body chemistry experts, singularly equipped to understand and cope with the alterations in sexual body chemistry responsible for the loss of sexual function in previously sexually active men. Furthermore, because endocrinologists are trained in the cognitive sciences, they routinely scan the complete diagnostic horizon in search of specific individual factors, or a coalition of factors, that may have derailed an individual man's sexual function. Often, a combined therapeutic approach is required, marshaling resources from several disciplines. Although impotence, or erectile dysfunction, may be the consequence of specific vascular, pharmacologic, hormonal, neurologic, or psychiatric contributions, causality is not always unifocal. Indeed, sometimes multiple problems coexist and collectively contribute to cripple man's sexual function. For effective treatment, all impediments to normal sexual function must be identified and then managed individually and collectively.

TYPES OF SEXUAL DYSFUNCTION

Sexual dysfunction may reflect problems with the following factors:

- Libido
- Ejaculation
- Erectile function
- A combination of activities

Reduced libido can result from organic or psychologic causes. It often accompanies low levels of testosterone or increased levels of prolactin, and these changes may be either primary or secondary. It could also be associated with psychologic problems, relationship difficulties, medical illnesses, and certain drugs.

Ejaculatory difficulties can be premature, retarded, absent, or retrograde. Premature ejaculation is more common in young men than in older men. It can disappear or diminish with increasing age and sexual experience. Men who have erectile dysfunction often complain of premature ejaculation. The exact definition of premature ejaculation is controversial, but ejaculation before or within 2 minutes after vaginal penetration would be a working definition. Psychologic or medical factors (or both) must be considered. Adrenergic agents, especially decongestants, are common causes, as is endogenous epinephrine produced by anxiety. Retarded ejaculation or anejaculation also can be due to psychologic, neurologic, or medical causes or some combination of these factors. Retrograde ejaculation is seen in neurologic disorders, especially diabetic neuropathy, or as a complication of transurethral resection of the prostate.

Erectile dysfunction is the most common problem, afflicting 80 to 85% of the patients seeking medical help for sexual dysfunction. Erectile dysfunction is defined as

the inability to achieve or maintain an erection of sufficient duration and firmness to complete satisfactory intercourse through vaginal penetration. In their definition of erectile dysfunction, Masters and Johnson included the fact that failure must occur in more than 25% of sexual attempts. This criterion highlights the fact that any man can fail occasionally and still be normal.

ERECTILE DYSFUNCTION

Erectile Physiology

Adrenergic impulses maintain tonic contraction of the smooth muscle of the corpora cavernosa in the flaccid state. Penile erections are the result of enhanced blood flow, caused by arteriolar vasodilatation and cavernosal relaxation attributable to nerve stimulation. Various stimuli trigger the higher centers of the brain, and nerve impulses flow down the spinal cord to the thoracolumbar ganglia (Fig. 1). This process causes nerve impulses (especially from non-A, non-C nerve fibers) to activate. The main neurotransmitter produced seems to be the endothelium-derived relaxing factor, nitric oxide (Fig. 2). This agent causes relaxation of the arterioles and cavernosal smooth muscle of the penis, which allows increased blood flow and increases the intracorporeal pressure to approximate the systolic pressure. The dilated corpora compress the venous outflow channels against the elastic tissue of the tunica albuginea, an action that prevents venous leakage and further increases the intracavernosal pressure to above systolic pressure. Just before ejaculation, the ischio-cavernosal and pubocavernosal muscles contract to increase intracavernosal pressure further; the response is ejaculation. Parasympathetic fibers also are stimulated by tactile sensation of the penile shaft, which travel in the pudendal nerve and function through the spinal reflex arc from S-2 to S-4. Thus, relaxation of the cavernous smooth muscle is enhanced, more blood flows to the penis, and, subsequently, intracavernosal pressure is increased. Usually, both mechanisms are at work to cause erections, but as men age, they derive less stimulation from the higher centers and need to rely more on direct penile stimulation—hence, the requirement of aging men to practice extended foreplay. The mechanisms involved are complex and may be related to decreased production or responsiveness to nitric oxide synthase, the enzyme that produces nitric oxide.

Aging-Related Erectile Changes

Before the causes of erectile dysfunction are discussed, the normal aging-related changes in erectile function should be reviewed. Some men seeking help need only reassurance that their symptoms are age-related physiologic changes in function.

In young men, the higher centers of the brain are easily stimulated by fantasizing or thinking about sex, which seems to cause an erection nearly at will. With aging, this ability decreases. Ability to reach arousal with suggestive photographs also becomes less effective, although arousal by viewing a suggestive video may remain longer.

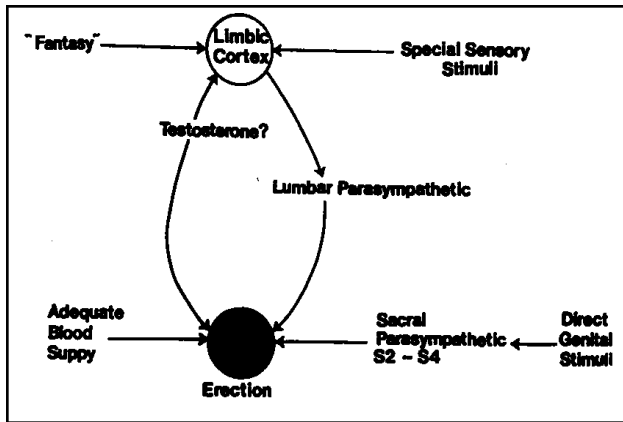


Fig. 1. Neural mechanism for producing penile erections. The nerve fibers involved are primarily the non-A, non-C type. (From Betts TA. Disturbances of sexual behavior. *Clin Endocrinol Metab.* 1975;4:619-641.)

Increased interaction of the couple, especially with foreplay, is needed to achieve a satisfactory erection.

Another aging-related change is an increase in the refractory period—that is, the time from ejaculation to the next erection. This interval may range from 30 minutes in a young man to several days in an octogenarian, according to the work of Masters and Johnson.

Erections, once achieved through fantasy and foreplay, are more fragile as men age. Older men must maintain their focus; if they allow themselves to be distracted by thinking of work or other activities, detumescence may occur. The telephone ringing may be enough to cause detumescence. In addition, men may occasionally experience detumescence without ejaculation for no apparent reason.

Causes of Erectile Dysfunction

The two main categories of dysfunction are psychological and organic. Often the category is “mixed,” inasmuch as both factors are important. Every man who has some problem with erectile function has an element of performance anxiety, and determining whether psychological factors are the main problem or merely a minor accompaniment may be difficult.

Organic causes are vascular, neurologic, hormonal, medical, or drug-related, and some men have multiple etiologic factors. Most of these causes affect the intrapenile vasculogenic mechanisms, whether arterial or venous. Another common finding is a decrease in local nitric oxide, which is thought to be the main neurotransmitter in initiating the erectile process. Intracorporeal fibrosis may also be present, which would limit the expandability of the corpora cavernosa, prevent the venules from compressing against the tunica albuginea, and thereby allow venous leakage from the penis.

Vascular Causes.—Among the vascular factors that can affect erectile function is a decreased blood flow to the penis. Decreased intrapenile circulation occurs if the corpora cavernosa cannot expand and fill with blood. Although atherosclerotic plaques, or damage by trauma or irradiation, decrease blood flow to the penis, vascular causes of erectile dysfunction are more often due to a failure of neural, muscular, or chemical factors. The vascular problem of venous origin, venous leakage, occurs when incomplete filling of the corpora, or intracavernosal fibrosis, causes failure of the veins to be pressed shut against the tunica albuginea.

Neurologic Causes.—A cerebrovascular accident (CVA or stroke), demyelinating diseases, or even seizure disorders can cause erectile dysfunction. Tumors or

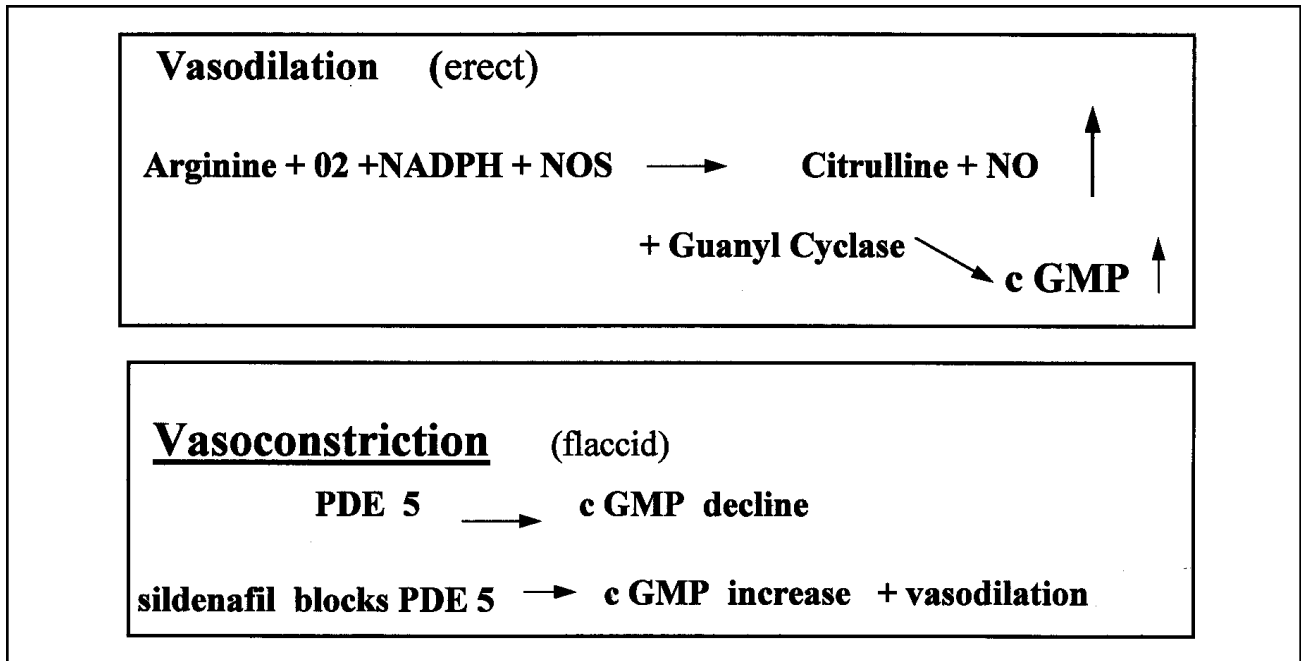


Fig. 2. The nitric oxide (NO) cascade. cGMP = cyclic guanosine monophosphate; PDE = phosphodiesterase. (From Spark RF. 1997.)

trauma to the spinal cord could also be causative factors. Peripheral nerves may be damaged by trauma or transurethral resection of the prostate. A common cause of impaired erectile and ejaculatory function is peripheral nerve damage due to diabetic autonomic neuropathy. This prevalence increases with time in both type 1 and type 2 diabetes, and the frequency of occurrence increases when the plasma glucose is poorly controlled.

Hormonal Abnormalities.—Hormonal causes are related to sexual dysfunction, especially erectile dysfunction. Most problems revolve around dysfunction of the hypothalamic-pituitary-gonadal axis and are associated with either excess prolactin or decreased testosterone levels. Other endocrine disorders that may cause libido or erectile difficulties include hypothyroidism, hyperthyroidism, adrenal insufficiency, or excessive levels of adrenal corticosteroids. In such cases, the effect is a generalized fatigue or weakness from the effects of the illness. Tumors of the hypothalamic-pituitary area may cause hypogonadism by mass effect, destruction of pituitary tissue, or oversecretion of prolactin, which may suppress gonadotropins and cause secondary hypogonadism. Postreceptor action of increased prolactin levels may also cause erectile problems, even in the presence of a normal testosterone level.

Prolactin overproduction due to medications, hypothyroidism with increased thyrotropin, chest wall injuries, or compression of the pituitary stalk can result in sexual problems. Rarely, if the patient has an excess of a variant large prolactin molecule, macroprolactin, the cause of the sexual difficulties will not be the prolactin because these molecules are biologically inert. Any major medical illness or surgical procedure can suppress the central axis and cause secondary hypogonadism. Primary hypogonadism occurs in some men as they age. A common cause of primary testicular failure is autoimmune destruction of the testicles. Another factor is unilateral mumps orchitis during the early adult years, with later failure of the “good testis.”

Hypogonadism is defined as a free testosterone level that is below the lower limit of normal for young adult control subjects. Previously, age-related decreases in free testosterone were once accepted as “normal.” Currently, they are not considered normal. Several clinical conditions were once accepted as normal age-related disorders but now are thought to be unhealthy—for example, hypertension, osteoporosis, and menopause. No agreement exists on the exact normal level of testosterone as men age or the serum testosterone level at which a man loses his sexual function. The definition of relative hypogonadism is also uncertain. Many men have perfectly normal sexual function even if their testosterone levels decline into the age-adjusted lower normal range. Patients with low-normal to subnormal range testosterone levels warrant a clinical trial of testosterone. The threshold of response to testosterone, and thus the necessary dosage, varies—especially in the younger decades of life. If LH is increased and the testosterone level is low, the patient will have decompensated primary testicular failure. Testosterone replacement therapy is then essential.

Men with testicular failure may suffer from sexual dysfunction, as well as osteoporosis, anemia, muscle weakness, depression, and lassitude, which is the clinical spectrum of hypogonadism. The sexual dysfunction, especially decreased libido and decreased erectile capacity, often reverses with testosterone replacement therapy. The variability of response in some patients may be related to comorbid medical illnesses, vascular dysfunction at the penile level, or psychologic factors.

Medical Conditions.—Any medical condition that can cause general debility has the potential to decrease sexual desire and performance. Pain, shortness of breath, angina, muscle weakness, or a CVA may be responsible for the dysfunction. The most common medical conditions associated with sexual difficulties are diabetes mellitus and hypertension, possibly because of the microvascular and neurovascular changes that are inherent in these conditions. In patients with diabetes, these factors may lead to a decrease in nerve stimulation and in nitric oxide generation. Some investigators have found hypogonadism to be commonly associated with diabetes mellitus. Poorly controlled plasma glucose levels add a separate risk factor, as does the presence of diabetic neuropathy. Not only is hypertension a separate risk factor for sexual problems but hypertension and diabetes often coexist in the patient. Generalized atherosclerosis and peripheral vascular disease may impede blood flow to the penis, as may a damaged vessel from pelvic injury or radiation therapy to the groin. Tobacco (cigarette smoking) can cause vascular insufficiency as well as a decrease in intrapenile nitric oxide levels. Excessive consumption of alcohol or use of other recreational drugs may cause sexual dysfunction, either by a direct effect on the penile neurovascular system or by causing increased prolactin or decreased testosterone production (or both). Peyronie’s disease is a condition in which collagen tissue is converted to fibrous tissue, for unknown reasons; a palpable fibrous plaque created in the tunica albuginea causes bending of the penile shaft. The usual manifestation is a bend to one side during erection, which can occasionally be painful.

Drug-Related Causes.—Both prescription and over-the-counter medications have been shown to be the cause of erectile problems in as many as 25% of cases (Table 1). Although single medications can induce erectile dysfunction, the adverse medication effects are often additive. This situation is particularly frequent in older men who are taking multiple medications and in whom partial or complete erectile dysfunction often results. A psychologic component can make partial erectile dysfunction progress to complete erectile dysfunction. Some medications can affect libido, whereas others affect erectile function or ejaculation. Nonprescription medications, such as antihistamines or decongestants, may affect erectile function. Most psychotropic drugs can affect libido or erectile function, through either a direct action or an increased prolactin or a decreased testosterone level. Although antidepressants may cause dysfunction in susceptible patients, they may also be beneficial in improving libido in depressed men. Antihypertensive medications may cause

Table 1
Sexual Side Effects of Common Prescription Medications

Generic name	Brand name	Sexual side effects
Antihypertensive medications		
<i>Diuretics</i>		
Spironolactone	Aldactone	Decreased libido, breast swelling, impotence
Thiazides	Diuril, HydroDIURIL, Naturetin, Naqua, many others	Impotence
Furosemide	Lasix	None
<i>Centrally acting agents</i>		
Methyldopa	Aldomet	Decreased libido, impotence
Clonidine	Catapres	Impotence
Reserpine	Serpasil, Raudixin, Ser-Ap-Es	Decreased libido, impotence, depression
<i>α-Adrenergic blockers</i>		
Prazosin	Minipress	“Dry” (retrograde) ejaculation
Terazosin	Hytrin	“Dry” (retrograde) ejaculation
<i>β-Adrenergic blockers</i>		
Propranolol	Inderal	Impotence, decreased libido
Metoprolol	Lopressor	Impotence, decreased libido
<i>Combined α- and β-adrenergic blockers</i>		
Labetalol	Normodyne, Trandate	Inhibited ejaculation
<i>Nonadrenergic vasodilators</i>		
Hydralazine	Apresoline	None
<i>Sympathetic nerve blockers</i>		
Guanethidine	Ismelin	Impotence, “dry” (retrograde) ejaculation
<i>Angiotensin-converting enzyme inhibitors</i>		
Captopril	Capoten	None
Enalapril	Vasotec	None
Lisinopril	Zestril	Impotence in a small percentage (1%) of cases
Psychiatric medications		
<i>Antidepressants</i>		
<i>Tricyclics:</i>		
Amitriptyline	Elavil	Inhibited ejaculation, impotence
Amoxapine	Asendin	Decreased libido, impotence
Desipramine	Norpramin	Inhibited ejaculation
Doxepin	Sinequan	Inhibited ejaculation, impotence
Imipramine	Tofranil	Inhibited ejaculation, impotence
Maprotiline	Ludomil	Inhibited ejaculation
Nortriptyline	Aventyl, Pamelor	Inhibited ejaculation
Protriptyline	Vivactil	Inhibited ejaculation, impotence
<i>Atypical agent:</i>		
Trazodone	Desyrel	Priapism
<i>Monoamine oxidase inhibitors:</i>		
Isocarboxazid	Marplan	Inhibited ejaculation
Phenelzine	Nardil	Inhibited ejaculation, decreased libido
Tranylcypromine	Parnate	Inhibited ejaculation

Table 1 (Continued)

Generic name	Brand name	Sexual side effects
<i>Antipsychotic medications</i>		
Phenothiazine group:		
Thioridazine	Mellaril	Inhibited ejaculation, priapism, decreased libido
Chlorpromazine	Thorazine	Inhibited ejaculation
Mesoridazine	Serentil	Inhibited ejaculation, decreased libido
Fluphenazine	Prolixin	Inhibited ejaculation, decreased libido
Serotonin reuptake inhibitors:		
Fluoxetine	Prozac	Anorgasmia (8%)
Perphenazine	Trilafon	Inhibited ejaculation
Trifluoperazine	Stelazine	Inhibited ejaculation
Thioxanthene group:		
Chlorprothixene	Taractan	Inhibited ejaculation
Thiothixene	Navane	Inhibited ejaculation, impotence
Butyrophenone:		
Haloperidol	Haldol	Inhibited ejaculation
<i>Antimania medication</i>		
Lithium carbonate	Eskalith, Lithobid	Possible impotence
<i>Antiulcer medications</i>		
Cimetidine	Tagamet	Decreased libido, impotence, gynecomastia
Ranitidine	Zantac	None
Famotidine	Pepcid	None

From Spark RF. Male Sexual Health: A Couple's Guide. Yonkers: Consumer Reports Books, 1991. 117-118.

erectile dysfunction either by drug-specific effects or by decreasing the systolic pressure and thereby decreasing the intracavernosal penile pressure. This result is especially prevalent in patients with diabetes or hypertension who have an underlying microvascular disease. Ketoconazole, aminoglutethimide, and similar drugs actually decrease the production of testosterone. Most of the earlier antihypertensive agents—such as reserpine, guanethidine, and hydralazine—caused sexual dysfunction. Some α -adrenergic blocking agents may cause sexual problems, but dysfunction with angiotensin-converting enzyme inhibitors or calcium channel blockers is less common. Some drugs (spironolactone, cimetidine, flutamide, or cyproterone acetate) may block the peripheral androgen receptors. Cimetidine may assume a greater importance because it can now be purchased without a prescription. Drugs such as α -methyl dopa, spironolactone, digoxin, metoclopramide, and many psychotropic agents may raise prolactin levels. Thiazide diuretics, finasteride, anticholinergics, and pain medications cause dysfunction in a certain percentage of patients.

EVALUATION OF SEXUAL DYSFUNCTION

An algorithm for evaluation of erectile dysfunction is shown in Figure 3.

Evaluation of the Couple

The initial assessment of a male patient with sexual dysfunction and his partner is best performed by a physician who has the training, experience, and interest in evaluating the relevant medical, psychologic, and hormonal factors. In many ways, the clinical endocrinologist is the physician best suited to direct the evaluation and treatment by the multidisciplinary team.

Ideally, the couple should undergo assessment together at the first visit or soon thereafter. A discussion about the partner is important. Is the patient married, single, divorced, or widowed? Newer relationships may have adjustment problems. The duration of the relationship is important, as is the age disparity between the partners. The health of the partner is very important because 15% of men report a decreased sexual frequency or ability because of health problems that their partners are experiencing, and the men are infrequently aware of this connection. The question of whether a couple is still sexually active in other ways is more revealing: do they practice alternative sexual techniques even if intravaginal penetration is not possible? This adjustment highlights their relationship in general and how comfortable they are with each other. The interviewer has to determine whether any relationship problems exist between the partners or whether external stresses may be a predominant factor. The dynamics

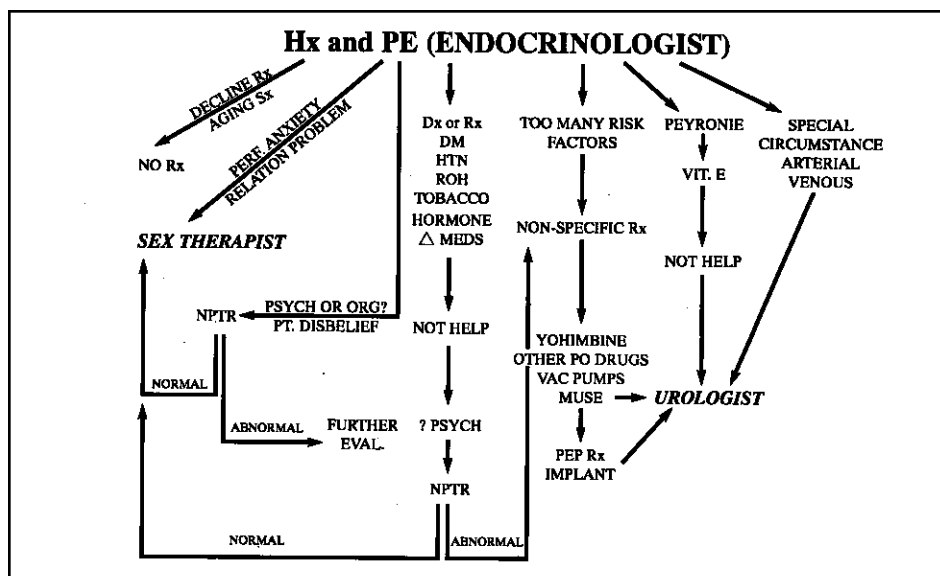


Fig. 3. Algorithm for office evaluation of erectile dysfunction. *DM* = diabetes mellitus; *Dx* = diagnosis; *EVAL* = evaluation; *HTN* = hypertension; *Hx* = history; *MEDS* = medications; *MUSE* = medicated urethral system for erection; *NPTR* = nocturnal penile tumescence and rigidity testing; *ORG* = organic; *PE* = physical examination; *PEP* = pharmacologic erection program (penile injections); *PERF* = performance; *PO* = peroral; *PSYCH* = psychologic; *PT* = patient; *ROH* = alcohol; *Rx* = treatment; *Sx* = symptoms; *VAC* = vacuum; *VIT. E* = vitamin. (From Bansal S. Sexual dysfunction in hypertensive men: a critical review of the literature. *Hypertension*. 1988;12:1-10.)

between the partners should be carefully observed. Relationship problems may be due to intrinsic philosophic differences between the two, and expectations about sexual fulfillment may also vary. Occasionally, the level of commitment to each other differs. Stresses may be present strictly because of performance anxiety or work problems, financial worries, or perhaps problems with children or other relatives. Oftentimes, inadequate communication between the couple, which is due to embarrassment, may be mistaken for lack of caring. The couple may begin to avoid contact and drift apart because of isolation or frustration. Even before sex therapy is considered, one or both parties may require stress management, or the couple might consider marital counseling before sexual counseling.

Sexual History

The examiner must evaluate the symptoms carefully because the sexual history is of considerable importance. Many men have only aging-related sexual changes, and reassurance is all that is necessary. With erectile dysfunction, the most common complaint is attainment of only partial erections that may not achieve vaginal penetration, or if the initial erections penetrate, early detumescence occurs without ejaculation. These problems may coexist in many patients. When organic factors cause the erectile dysfunction, the patient can also develop a fear of failure, which may then lead to a decrease in sexual interest and even avoidance of the partner. Total loss of all penile rigidity is uncommon. The duration of the problem is useful to know because patients who have had sexual difficulties for years tend to have more psychologic

adjustments to make, even with successful therapy. If nocturnal or morning erections are present and strong, it will direct the evaluation toward psychologic causes, or it may simply mean that a certain medication might have decreased its concentration (and its adverse effect) during the night. The absence of nocturnal erections can mean that the patient is no longer awakening out of rapid eye movement (REM) sleep, during which time most erections occur, and it does not necessarily mean that the patient has organic erectile dysfunction.

Medical History

In determining the possible medical risk factors that might be related to erectile dysfunction and other aspects of sexual dysfunction, both prescription and over-the-counter medications should be listed. (A list should be prepared in advance by the patient in order to save time.) The patient should be asked about tobacco and alcohol abuse as well as use of other recreational drugs. High-risk disorders must be reviewed. Is diabetes mellitus, hypertension, coronary artery disease, or peripheral vascular disease present? Loud snoring should prompt a workup for sleep disorders. Conditions such as sleep apnea, nocturnal myoclonus, or restless legs may directly affect the higher sexual centers or cause secondary hypogonadism. CVA or seizure disorders (and seizure medications) occasionally are associated with sexual dysfunction from central nervous system mechanisms. Any severe debilitating disease can be a potential cause of sexual dysfunction. A history of emotional illness or surgical procedures, especially of the colon and prostate, should be elicited. Transurethral resection of the prostate is associated with a substantial

risk of nerve damage to the penile nerves. As the patient ages, the possibility of multiple factors causing erectile dysfunction increases. If one adds concurrent performance anxiety and stresses of daily living, the situation often is difficult to assess. Teaching the patient and his mate the interrelationships of the multiple factors, however, helps to eliminate the barriers to successful treatment.

Physical Examination

A comprehensive physical examination is necessary for assessment of blood pressure, secondary sex characteristics, gynecomastia, thyroid abnormalities, femoral pulses, scrotal formation, urethral position, and the penile shaft for fibrous plaques. The testicles should be evaluated for size and consistency and to exclude nodules. Linear measurements (length and width) may be used, but a more accurate determination can be obtained with the Prader orchidometer—a series of elliptical spheres of various volumes to assess testicular size (in different reports, the lower limit of normal volume has varied from 15 to 18 cc). Sensory adequacy of the penile shaft and perineum can be evaluated roughly by touch and pinprick. A more sophisticated bioesthesiometry apparatus may be used, but the investigator must be aware that nerve conduction and penile sensation normally decrease with age. The bulbocavernosus reflex and rectal sphincter tone must be assessed because both are mediated by the S2-4 spinal reflex arc. The bulbocavernosus reflex is tested with the finger in the rectum directed laterally to where the muscle is inserted. A moderate squeeze on the glans penis will cause the bulbocavernosus muscle to contract if the reflex arc is intact. A screening neurologic examination is necessary.

Diagnostic Tests

Diagnostic testing may be categorized as follows:

- Blood chemistry
- Vascular assessment
- Sensory studies

Blood Tests.—Blood testing should assess anemia, increased plasma glucose levels, or impaired renal function. Thyroid testing should be done if clinically indicated. Other hormone screening should include serum testosterone level and a prolactin level. The “normal” range for testosterone is also controversial. The Massachusetts Male Aging Study confirmed that free testosterone decreases 1.2% per year and bioavailable testosterone decreases 1.0% per year, while the sex hormone binding globulin increases 1.0% per year, between the ages of 40 and 70 years. For this reason, free or bioavailable testosterone assays are preferred over the total testosterone level. The free fraction of testosterone may be assessed by equilibrium dialysis or by ultrafiltration. It may also be calculated after total testosterone and sex hormone binding globulin levels are determined. Because of the diurnal variation of testosterone secretion, obtaining several morning samples or pooling of multiple samples would be advisable. These and other recommendations have been elucidated fully in the AACE clinical practice guidelines for evaluation of

hypogonadism in adult male patients. If the testosterone level is low, or even borderline, a serum LH level should be obtained to distinguish primary from secondary hypogonadism. Compensated primary hypogonadism is present when the testosterone level is normal but the LH level is increased. Some testosterone deficiency is present, but the testicle is still compensating. Further testicular failure can be anticipated. Whether to follow the patient or to initiate treatment is an individual clinical decision.

Vascular Assessment.—Vascular flow to the corpora cavernosa may be quantified with the use of a penile Doppler examination. With use of penile blood pressure and brachial blood pressure, a ratio called the penile brachial index (PBI) is determined. Unfortunately, it has been suggested that a low PBI, which is supposed to correlate with a decreased penile blood flow, correlates better with coronary artery disease than it does with erectile dysfunction. Routine measurement is not recommended. The one instance in which the PBI may be of value is in the pelvic steal syndrome. A minor blockage of a small artery may not cause symptoms in the relatively inactive state of foreplay; thus, an erection may be normal. After penetration and pelvic thrusting, however, shunting of the blood to the pelvic musculature may cause detumescence prematurely. This condition is diagnosed by obtaining a PBI before and after exercise, either on a treadmill or with multiple deep knee bends; a decrease in the PBI of 0.15 or more is presumptive evidence of the pelvic steal syndrome.

A screening office examination may be done to assess the effect of a penile injection with 10 µg of prostaglandin E₁ or 10 mg of papaverine, with or without visual sexual stimulation. If an erection capable of penetration is obtained, a serious vascular deficiency is ruled out. If needed, the erection can be reversed by a penile injection of 0.2 to 0.4 mg of phenylephrine. A more sophisticated evaluation can be achieved by using color duplex ultrasonography, which measures cavernous artery diameter and inflow pressure, along with the end-diastolic pressure, which assesses venous leakage. This procedure is performed after a similar penile injection of prostaglandin or papaverine. It has also been suggested that endogenous epinephrine, generated by a patient’s embarrassment, fear, or anxiety, affects the validity of the test results. Venous leakage is tested by the intracavernous infusion of saline and radiopaque dye at various rates of flow and pressure.

Sensory Testing.—Bioesthesiometry testing was mentioned previously for penile sensory testing. A more sophisticated testing method might involve the use of electromyography, especially in diabetic neuropathy. Various other tests will screen for autonomic neuropathy. Recently, investigators have attempted to use pelvic evoked potentials, but experience with this technique is limited. No currently available test can assess the penile stimulating nerves clinically.

Nocturnal Penile Tumescence and Rigidity Testing.—Occasionally, the measurement of nocturnal penile tumescence and rigidity is useful. This technique was developed in sleep laboratories several decades ago

when normal men were found to have appreciable erectile activity during REM sleep. Tumescence is monitored by the placement of mercury strain gauges to the base and tip of the penile shaft. When a substantial tumescence episode is noted on the monitor, the sleep laboratory technician presses down on the head of the penis with a pressure plate to determine at what force the glans will buckle—hence the term “buckling pressure.” This finding correlates roughly with an erection that is rigid enough for vaginal penetration. This type of testing is expensive, and some results are questionable because of the unfamiliar surroundings, the startle response, and the embarrassment when the patient is awakened for measurement of the buckling pressure.

A Velcro strap, called the “snap gauge,” has also been developed for use by the patient at home. It has three plastic bands that break at different tensile strengths—80, 120, and 160 mm Hg. It responds to the enlarging penis (that is, the tumescence) but gives limited or little information about penile rigidity. Penile rigidity was originally thought to correlate with tumescence, but it is now believed that up to 20% of men with organic erectile dysfunction have normal penile tumescence but abnormal rigidity when tested at night and would be incorrectly diagnosed as having normal nocturnal penile activity. The snap gauge also responds to one nocturnal event but does not reveal the number and duration of nocturnal events, factors that are considered important in evaluating nocturnal penile tumescence and rigidity activity.

These deficiencies have been corrected with the development of the RigiScan portable home monitor. The recording unit is inserted into the Velcro thigh holster, and disposable strain gauge loops are placed on the base and tip of the penis. Tumescence and rigidity, at both the base and the tip, are recorded separately and stored on a computer chip inside the device. The measurement of rigidity is indirect—that is, circumferential rather than the more direct axial pressure measured in the sleep laboratory with use of buckling pressure. Good correlation has been shown, however, between the two techniques. The alternative to using the portable home monitor is to refer the patient to a sleep laboratory that evaluates nocturnal penile activity.

The RigiScan monitor is useful in certain situations and can easily be set up in the physician’s office. The machine is demonstrated to the patient by attaching the strain gauges and obtaining a 5-minute baseline measurement. The patient then uses the monitor at night while sleeping, in the privacy of his own home, for 2 nights. The monitor is then returned, the information is downloaded, and a graph is generated for analysis by the physician.

The main purpose of the RigiScan test is to distinguish between normal and abnormal nocturnal erectile function. The main indications are as follows: (1) inability to determine clinically whether the problem is organic or psychologic, (2) ability to diagnose psychologic erectile dysfunction clinically but refusal by the patient to believe the physician, and (3) continued erectile dysfunction after correction of medical factors, and the differential diagnosis again is between organic and psychologic dysfunction.

Situations in which the results of nocturnal penile testing could be misleading include (1) severe psychosis, from either anxiety or depression (the pattern may be abnormal, such as seen in organic disease) and (2) the presence of sleep disorders that can disrupt REM sleep, during which 90% of nocturnal erections occur. Simple questions about sleep apnea, nocturnal myoclonus, or severe snoring prove to be an adequate screen. If these conditions are present, the patient should be referred to a sleep laboratory for a comprehensive evaluation.

TREATMENT OF SEXUAL DYSFUNCTION

Some men simply require reassurance that their concerns reflect aging changes and that their sexual function is indeed what is expected for their age. Some men refuse treatment. They only wish to be reassured that their sexual deficiency is not a symptom of a more serious illness. Most men, and indeed couples, prefer a diagnostic evaluation and therapeutic counseling. After discussion of the therapeutic options, some couples do not wish any treatment for erectile problems directed toward intravaginal penetration and would prefer just to engage in alternative sexual techniques such as mutual masturbation.

Psychologic Treatment

The couple should be compatible. Both partners should be willing to participate and cooperate with therapy. Major relationship problems should be addressed before therapy is introduced. Similarly, major stresses with work, finances, or family will need to be evaluated and treated first. Performance anxiety, specifically related to fear of sexual failure, is best evaluated and treated by a qualified sex therapist (psychologist or psychiatrist). At times, minor relationship problems manifest after organic causes of sexual dysfunction have been corrected. These minor problems may be caused by fear of failure, fear of frustration, or embarrassment. Decreased libido may be psychologic in origin and may necessitate sexual therapy and possibly pharmacologic treatment. Ejaculation problems can be either organic or psychologic, and the sex therapist will help patients with premature ejaculation as well as with problems involving anejaculation or retarded ejaculation. At times, a female partner might not be knowledgeable about, and may be reluctant to participate in, the increased foreplay that men require to obtain erections as they age. The therapist can reaffirm the need and teach the techniques.

Medical Treatment

If organic problems seem to be dominant, the first step is to discover which are reversible. Alcohol intake should be decreased, or stopped, if excessive. Use of illicit drugs must be discontinued. Cessation of tobacco abuse is important, with or without the use of pharmacotherapy. Offending medications could be changed or stopped. Plasma glucose must be regulated in uncontrolled diabetes mellitus. Hypertensive medication must be optimized. Sexual dysfunction can be a motivational tool to increase patient compliance in chronic disease.

Hormonal Treatment

Benign prostatic hyperplasia, prostate cancer, sleep apnea, and polycythemia must be evaluated before and after initiation of testosterone therapy. A baseline prostate-specific antigen level should be determined before treatment; if this value is even slightly increased, the patient should be referred to a urologist for a prostate evaluation. Any patient treated with replacement androgens should be reassessed within a few months after initiation of therapy and then at 6- to 12-month intervals to ensure that clinical problems have not appeared or worsened during such treatment. The presence of prostate cancer is a contraindication to androgen therapy, whereas sleep apnea, peripheral edema, polycythemia, and benign prostatic hyperplasia are relative contraindications that may respond to adjustments in the medication or specific treatments (use of continuous positive-airway pressure or weight reduction).

Testosterone replacement for the treatment of hypogonadism may also correct sexual dysfunction, unless the patient has other comorbid illnesses. For decades, the standard has been a depot intramuscular injection of testosterone enanthate or cypionate every 2 or 3 weeks (200 mg or 300 mg, respectively). Smaller dosages and more frequent injections, however, are better at maintaining circulating testosterone in the normal range (that is, 50 to 150 mg of testosterone enanthate or cypionate intramuscularly at 7- to 14-day intervals). An alternative approach is to administer 100 mg on days 1, 11, and 21 of each month, while allowing some flexibility of injection days. If testosterone levels are measured, they should be in the normal range just before the next injection. Currently available tablets for oral administration have generally not been used because of potential liver toxicity. A newer oral tablet, testosterone undecanoate, has been used for more than a decade in Europe but has not yet been approved for use in the United States. Although the safety is not questioned, multiple daily doses are required and the absorption is erratic. Other orally and sublingually administered tablets are being evaluated. Implantable testosterone pellets, which are used in other countries, and other forms of intramuscular testosterone preparations are also being evaluated.

Testosterone scrotal and nonscrotal patches have now been approved by the Food and Drug Administration (FDA). Testosterone absorption is greater through scrotal skin. The scrotal patch was the first to be introduced. These patches are placed on the scrotal skin and are changed daily, in the morning. For many patients, weekly shaving of the scrotum is necessary. The patch increases testosterone levels to the normal range, which remain stable. Because 5 α -reductase in scrotal skin is high, the dihydrotestosterone (DHT) level in serum is quite high. The role of DHT is currently being investigated. It may have little biologic activity because it is largely bound to sex hormone binding globulin.

The nonscrotal patch, applied daily in the evening, may be worn in various sites on the skin. The manufacturer recommends that it not be used over bony prominences. The levels of testosterone increase during the nighttime

hours, a pattern mimicking the body's normal diurnal variation. The levels remain stable in the middle of the normal range, and the DHT levels remain normal. Contact dermatitis at the site of application is seen in approximately a third of the patients. Some patients may control this skin reaction with triamcinolone cream, but 10% of patients may have to discontinue the use of testosterone patches.

With any form of testosterone treatment, the patient may have a slow and steady increase in libido and erectile capacity during a course of months. If no improvement is noted after 3 months, the hormone deficiency may not be the only cause of the sexual dysfunction. A comorbid medical illness might also be present, or perhaps performance anxiety is dominant.

The hypothalamic-pituitary-gonadal axis has been shown to decrease functioning temporarily after acute medical events or surgical procedures; this action can cause low gonadotropin and testosterone levels. Such a temporary decrease in testosterone levels may also occur as a result of less serious circumstances, such as anxiety, alcohol excess, multiple medications, or uncontrolled diabetes. Patients with these causes are less likely to respond to testosterone replacement. Stimulation of gonadotropins with clomiphene citrate and the subsequent increase in testosterone levels emphasize the functional and reversible nature of this phenomenon; short-term use of clomiphene citrate may help some patients. Occasionally, low testosterone levels are due to suppressed gonadotropins attributable to an increased prolactin level. This situation can be reversed by treatment with bromocriptine or pergolide. If increased prolactin is due to a psychotropic drug, however, withdrawing or switching the medication may be all that is needed.

Treatment of other endocrine disorders, such as hypothyroidism or hyperthyroidism, reverses the libido or erectile dysfunction that accompanies these and other hormonal disorders. Uncontrolled diabetes mellitus may respond to improved plasma glucose control, especially in patients with recently diagnosed diabetes. Even patients with diabetes who have been afflicted for more than 10 years may respond to better control if major neuropathy is absent. Hypogonadism also seems to be especially prevalent in patients with diabetes, and many respond to testosterone treatment.

Current Nonspecific Treatments for Erectile Dysfunction

Some patients do not respond to the aforementioned corrective measures and need nonspecific therapy (Table 2). This scenario might especially exist in older men and those with numerous medical risk factors. The major options to consider at the present time are yohimbine tablets, vacuum pump devices, venous constriction rings, intracorporeal injections of various chemicals, intraurethral drug suppositories, intrapenile arterial or venous surgical procedures, penile implants, or, the latest treatment, orally administered phosphodiesterase inhibitors. Trials with sublingually administered apomorphine and vasodilators are ongoing.

Table 2
The Most Commonly Used Nonspecific
Treatments for Erectile Dysfunction

Yohimbine tablets
Venous constriction rings
Vacuum devices
Pharmacologic erection program
Intracorporeal injections
Papaverine-phenolamine
Papaverine-phenolamine-prostaglandin E ₁
Prostaglandin E ₁
Potassium channel openers (?)
Intraurethral suppositories
Prostaglandin E ₁
Penile microvascular arterial bypass operation
Penile venous ligation surgical procedure
Penile implants
Flexible rods
Inflatable cylinders
Orally administered phosphodiesterase inhibitors
Sildenafil

Sildenafil has recently been approved by the FDA. It inhibits phosphodiesterase, type 5, which predominates in the penile tissue (Fig. 2). This prevents the breakdown of cyclic guanosine monophosphate which, therefore, increases smooth muscle relaxation in the corpora cavernosa and enhances penile rigidity. There are three doses, 25 mg, 50 mg, and 100 mg. Usually the trial is begun with the 50-mg tablet, which is then decreased to 25 mg if there are significant side effects and increased to 100 mg if there is lack of efficacy. The tablet is taken 1 hour before sexual activity and sexual stimulation are definitely required. Sildenafil is contraindicated if the patient is taking nitrates in any form; enhancement of hypotension has occurred, with resulting syncope. Side effects are generally mild and tolerable: headaches, hot flashes, heartburn, diarrhea, myalgias, hypotension, and dizziness. The drug may inhibit phosphodiesterase, type 6 in the eye, with resultant difficulty in discriminating blue from green, bluish tones in vision, or difficulty seeing in dim light. It is yet to be determined whether or not there is any adverse effect in diabetic retinopathy or other eye diseases.

Yohimbine is a derivative of the African yohimbe tree and has been available for several decades. This α_2 -antagonist is effective in some cases of psychologic or organic erectile dysfunction, but its efficacy is controversial. The tablet is available in one strength, 5.4 mg (1/12 gr), and the standard dosage is one tablet three times a day. If there will be a response, it will generally occur within the first 4 weeks. A short course of two tablets three times a day may be tried, but the increase in responders will be small. Several reports have described a positive response over placebo in psychologic erectile dysfunction. A response can occur in patients with organic conditions, but this

evidence is weaker. If a patient has noted a positive response, the dosage is then adjusted because many patients respond to one or two tablets 1 hour before sexual activity is desired. Major side effects are uncommon, but minor symptoms, including headaches, dizziness, insomnia, and anxiety, may occur in 25% of cases during the first week of treatment. Patients who have blood pressure that is difficult to control might notice a pressure increase. The addition of trazodone to the treatment regimen increased the number of responders but also increased the number of potential side effects. Trazodone has been shown to be useful alone, especially in men without known organic causes for erectile dysfunction, in dosages of 25 to 200 mg/day. The increased nocturnal penile activity has been objective evidence of improvement unrelated to any potential placebo effect.

Treatment directed to the skin of the penile shaft has been attempted. Nitroglycerin paste increased penile rigidity but rarely enough to allow penetrability. Furthermore, absorption into the female partner often caused headaches. The use of a nitroglycerin patch decreased this side effect but did not enhance the therapeutic response. Topically applied minoxidil, alone or in combination with a transdermal enhancing compound, did not improve erections enough to warrant its general use.

Patients who have good rigidity of their erections but who have early detumescence, perhaps due to venous leakage, benefit from the use of rubber constriction rings. These devices are placed around the base of an erect penis to prevent the blood from leaving, which causes detumescence. Various kits are available with multiple sized rings, and the patient tries them in decreasing order of size until the blood remains in the penis while causing no discomfort. A newer adjustable soft latex ring has been developed that is considerably less expensive. All of these devices should be used in accordance with the manufacturer's directions.

Another form of therapy is the use of a vacuum pump and a plastic cylinder into which the penis is inserted. Air is pumped out of the cylinder, and the negative pressure draws blood into the penis to create an erection. Then a rubber ring is secured at the base of the penis to prevent exit of the blood; the ring can be worn for a maximum time of 30 minutes. This technique is safe but mechanical, and the erection is composed mainly of venous rather than arterial blood. Thus, the penis appears somewhat cyanotic, and the glans is cooler. Older men with long-standing relationships tend to accept this form of therapy more than do younger men, who may not have a steady partner. In certain conditions in which intrapenile fibrosis is present (Peyronie's disease), use of the vacuum pump may help to break up adhesions.

Intrapenile injections were introduced about a dozen years ago. Papaverine and phenolamine were commonly used together to cause intrapenile vasodilatation and muscle relaxation of the corpora cavernosa. Some physicians added alprostadil (prostaglandin E₁) to the mixture, but the amount had to be limited because of penile discomfort from the alcohol in the solution. Recently, alprostadil used alone was approved by the FDA; it remains the only

officially approved drug for intracavernosal injection. Prostaglandin E₁ is available in powder form, which is dissolved by the addition of bacteriostatic water. This medicine occasionally causes discomfort after the injection. The correct dose is found by beginning with the injection of 5 µg in the office. If necessary, the dosage may be cautiously increased at 48-hour, or longer, intervals. The medicine is injected at the base of the penis, along the dorso-lateral penile shaft (at the 2 o'clock and 10 o'clock positions), to avoid the dorsal midline blood vessels and nerves as well as the ventral urethra. An erection occurs within 10 minutes with normal foreplay and may last 30 to 90 minutes. The major side effects, which occur in 3 to 10% of patients, are penile pain, cavernosal scarring, or priapism. An orally administered adrenergic compound, such as ephedrine, pseudoephedrine, or terbutaline, is given if the erection lasts longer than 1 hour and can be administered hourly if needed. If unsuccessful in causing detumescence by 3 hours, treatment with intracavernosal injection of phenylephrine or norepinephrine in the physician's office or an emergency department is then recommended. Intracavernosal lavage by a urologist may be necessary in refractory cases inasmuch as permanent damage to the corpora cavernosa may occur if priapism goes untreated for more than 6 hours.

Other substances have been used, or proposed, for penile injections. Potassium channel openers are currently being evaluated. These agents may be useful when other compounds have failed, and they may cause fewer side effects.

A prostaglandin E₁ intraurethral suppository has been approved by the FDA for general use. This form of treatment is more acceptable than penile injection for many patients. There are four doses that should be titrated, from 125 µg to 1,000 µg. The pellet (2 to 3 by 1 mm in size) is inserted into the urethra with the aid of a plastic applicator. Absorption is 80% complete within 10 minutes. An erection similar to that seen with intracavernosal injection will last between 15 and 60 minutes. The response rate is said to be 65%, but some clinicians believe it may be lower. The difference in results might depend on how the medication is dispensed and whether adequate discussion has taken place in the physician's office, including an initial supervised trial. Although transient penile discomfort may occur, 5 to 10% of patients will have substantial pain that will preclude any further use of the medication. Priapism may occur but seems to be uncommon. Many clinicians give patients adrenergic agents to use (pseudoephedrine, ephedrine, or terbutaline) in case the erection lasts longer than 2 hours. If the erection problem persists after 4 hours, more aggressive treatment is necessary.

In the past, rearterialization of the penis or venous ligation for venous leakage was performed. After review of the high rate of failure for these procedures, a National Institutes of Health Consensus Conference published in 1993 suggested that these procedures be done only as part of strict research protocols. Special cases such as destruction of an artery after trauma to the pelvis or common penile artery in the perineum or after radiation therapy,

especially in younger patients, deserve consideration for rearterialization of the penis. Bypass surgical procedures for generalized atherosclerotic disease are discouraged because of the low success rate.

If these forms of therapy are unsuccessful or unacceptable to the patient, another option is the use of penile implants—either permanent flexible rods or inflatable cylinders. Treatment failures attributable to infection, extrusion, or mechanical failure, especially in patients with diabetes, previously were as high as 36%, but better equipment and techniques have reduced these complications. If a patient wants more details, particularly about the involved surgical procedure, failure rate, and risks, he should be referred to an experienced urologist.

CONCLUSION

Sexual dysfunction, especially erectile dysfunction, necessitates a comprehensive medical and psychological evaluation involving both partners. All possible risk factors should be outlined and corrected when feasible. Psychological factors and relationship problems should be referred to a qualified sex therapist, and surgical options should be addressed by a urologist. The endocrinologist, however, should be the evaluating physician who supervises the medical and hormonal treatment and who refers the patient, as necessary, to other members of the multidisciplinary team.

DISCLAIMER

These guidelines are intended as a general outline but not meant to dictate or delineate any specific treatments for patients. The area of sexual dysfunction, and especially erectile dysfunction, is a relatively new discipline. Basic physiologic and pathologic data have recently been enlarged upon, and many vague and controversial areas remain. Whenever possible, we have voiced a majority opinion or else mentioned various possibilities. New technology and new treatment modalities will keep this field dynamic and in a state of evolution. Ideas will be modified as new data become available.

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TREATMENT OF SEXUAL DYSFUNCTION

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CONCLUSION

1. **NIH Consensus Development Panel on Impotence.** Impotence (NIH Consensus Conference). *JAMA*. 1993; 270:83-90.

APPENDIX
System of Care for Male Sexual Dysfunction

Step 1: Accurate history (preferably with the couple)

- A. Make sure concerns are not just aging changes
- B. Inquire about relationship problems
- C. Question about performance anxiety
 - Action:* Reassure if A
 - Send to sex therapist if B or C
 - Do nocturnal penile test if unsure
- D. Outline medical risk factors and medications
 - Action:* Change or discontinue medications
 - Stop any substance abuse

Step 2: General examination

- A. Blood pressure
- B. Breasts for gynecomastia
- C. Secondary sex characteristics
- D. Peripheral circulation
- E. Genital examination
 - Especially for: penile fibrosis, testicular atrophy, bulbocavernosal reflex
- F. Rectal examination
 - Especially prostate
 - Action:* Follow-up on abnormal findings—that is, cardiovascular findings, suspected endocrine diseases, or abnormal prostate

Step 3: Laboratory tests

- A. Plasma glucose
- B. Prolactin
- C. Free testosterone
- D. Luteinizing hormone and follicle-stimulating hormone if testicular atrophy suspected
- E. Thyrotropin if hypothyroidism suspected
- F. Other tests, depending on history and physical examination

Step 4: Treatments

- A. Related to risk factors
 - Action:* Diagnose diabetes
 - Stop substance abuse
 - Change medications
 - Treat abnormal hormones (testosterone or prolactin)
 - A 3-month testosterone trial, if indicated
 - Nocturnal penile tumescence and rigidity testing if risk factors changed and nonresponse may be due to psychologic factors
- B. If good erections but early detumescence—venous constriction ring
- C. Nonspecific treatments
 - Trial sildenafil
 - Trial yohimbine
 - Other orally administered drugs, phentolamine, apomorphine (when approved)
 - Apomorphine (sublingually)
 - Vacuum pump
 - Medicated urethral system for erection (intraurethral prostaglandin pellet)
 - Penile injections
 - Papaverine and phentolamine
 - Triple mix
 - Alprostadil
 - Penile implants (as last resort)
- D. Surgical referrals (urologist)
 - Severe Peyronie's disease
 - Penile injections (if not done by endocrinologist)
 - Penile implant
 - Selected cases of arterial damage or venous ligation