

Erectile Impotence: Evaluation and Management

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Dramatic progress in the understanding and treatment of erectile impotence has occurred over the past decade. Most cases have an organic cause that is related to vascular (arterial or venous) supply, innervation, or the hormonal milieu of the penis. Multifactorial causes of organic impotence are common and include diabetes mellitus, alcoholism, renal failure, and liver failure. Medications may cause impotence by a variety of mechanisms. The history and physical examination, along with simple laboratory tests, are the mainstay of evaluation and may be performed appropriately by family physicians.

Successful new forms of nonsurgical treatment include penile self-injection with papaverine (sometimes with phentolamine) and penile-suction devices. Penile prostheses have been improved greatly in recent years. The patient may select among semirigid, multicomponent inflatable, and self-contained inflatable devices. New surgical treatments include penile arterial revascularization (for atherosclerosis) and ligation of the dorsal vein of the penis (for venous leak).

As recently as 1975 a popular general urology text stated that at least 90 percent of erectile impotence was psychogenic.¹ The prognosis was poor, as various types of psychotherapy had in common low response rates.

Since that time, great progress in the understanding of the mechanism and physiology of erection and in the development of laboratory methods have made it clear that only a few cases of impotence are psychogenic, and that most cases have an organic cause.^{2,3} With the application of this new knowledge, most impotent men can be helped.

PHYSIOLOGIC CONSIDERATIONS

Erection is caused by the inflow and trapping of blood in the lacunae, or pockets, of three bodies of penile tissue: two corpora cavernosa and one corpus spongiosum. The trapped blood makes the corpora, and thus the penis, longer, wider, and stiffer. The movement of the blood is controlled by a complex mechanism that involves both the autonomic and the voluntary nervous systems and requires proper activity by the penile arteries and veins.

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Most men have difficulty obtaining or maintaining an erection at some time in their lives, such as when they are tired, ill, or under great stress. This reaction is normal. Only when the inability to have an erection persists is the condition designated erectile impotence; even then, the ability to have a normal orgasm may remain, as the physiologic mechanisms of erection and orgasm are different.

ETIOLOGY

Organic Causes

Any process that interferes with the penile vascular supply, innervation, or hormonal milieu may produce organic impotence.

Vascular causes of impotence may be arterial or venous, with the former being more common. Both interference with blood flow in larger vessels, as in aortoiliac occlusive disease, and damage to smaller vessels, as in peripheral vascular disease, are common causes. In many patients, heavy smoking appears to be the inciting agent, as heavy smokers have a higher incidence of erectile impotence than do nonsmokers.⁴ A recent discovery is "venous leak" impotence, in which arterial inflow of blood to the corpora cavernosa is normal, but the blood drains out almost immediately. This patient typically achieves an erection, or the beginning of one, but loses it within a few minutes.

Neurologic impotence may be the result of trauma, disease, or medical treatment. Neurologic disorders re-

sponsible for impotence include spinal cord injury, multiple sclerosis, and various peripheral neuropathies, especially diabetes. Radical extirpative surgery for cancer of the prostate, bladder, or rectum often causes impotence, although newer operative techniques have reduced the risk. On the other hand, transurethral resection for benign prostatic hyperplasia rarely causes impotence, although it does cause retrograde ejaculation. Pelvic radiation may also cause impotence.

Several years ago it was widely believed that low levels of testosterone were responsible for many cases of impotence, and the pharmaceutical companies widely advertised their testosterone preparations for this indication. It is now known that low testosterone levels account for less than 10 percent of the causes of organic impotence. The usual cause is primary testicular failure or anterior pituitary failure. One should not diagnose low-testosterone impotence in the absence of proof, as even men who one might think would certainly have the condition do not always have it. Almost one half of previously potent men who undergo bilateral orchiectomy for prostate cancer remain potent,⁵ perhaps on the basis of testosterone produced from adrenal cortical androgens. A few cases of organic impotence are secondary to a prolactin-secreting pituitary tumor.⁶

Some types of organic impotence have multifactorial or poorly understood causes. For example, diabetes mellitus often leads to impotence as a result of some combination of vasculopathy and autonomic and peripheral neuropathy. Retrograde ejaculation may also occur, probably secondary to autonomic neuropathy. Either renal or hepatic failure may lead to impotence, and alcoholism is often associated with impotence even in the absence of hepatic dysfunction. Alcoholic impotence is not always reversible, even if the patient achieves sobriety.

A final type of organic impotence is that induced by drugs. Antihypertensive agents such as methyl dopa (Aldomet) and large doses of β -blockers such as propranolol (Inderal) may produce impotence, perhaps through their effects on the autonomic nervous system and possibly because the reduction of blood pressure reduces the "pressure head" in atherosclerotic pelvic blood vessels below that which permits engorgement of the corpora. Antipsychotic drugs such as the phenothiazines and tricyclic antidepressants may also result in impotence, perhaps by causing hyperprolactinemia. Long-term use of anabolic steroids may lead to impotence when the drug is discontinued. Conflicting data have been reported on the effects of various illicit drugs.

Psychogenic Causes

Most psychogenic impotence occurs in psychologically healthy men who find themselves in difficult circumstances. For example, sudden financial hardship or serious problems at work can cause such severe anxiety and preoccupation that the man has difficulty obtaining an

erection. When the stress subsides, the ability to have erections usually returns to normal. If a man becomes too upset about his failure to obtain an erection once, however, the problem may continue. This cause of impotence is called "performance anxiety." Temporary erectile difficulties may also lead to performance anxiety problems in a man with a disease known to cause impotence; a man with diabetes or multiple sclerosis may misinterpret a single failure to obtain an erection as evidence of disease-induced damage that has not yet occurred.

Some men have situational impotence—a man may be impotent with one partner but not with another. A man in a deteriorating marriage may be unable to have an erection with his wife, whereas a man involved in a relationship about which he feels intense guilt, such as an extramarital affair, may be impotent with the other woman only. A man may be unable to obtain an erection under physical conditions he feels to be inappropriate for sexual intercourse.

EVALUATION

Although some specialized tests may be necessary in the evaluation of impotence, much of the workup does not require special facilities and, indeed, may be best performed by a family physician who knows the patient well. A thorough medical and sexual history and physical examination is the first and most essential step in evaluating impotence. The medical history should cover operations, medications, injuries, and any known conditions such as diabetes, hypertension, and cardiovascular disease (eg, angina, claudication). Information about nonspecific constitutional signs and symptoms such as fatigue and weight loss should be sought. It is important to know whether the patient smokes or has ever smoked and how much alcohol he consumes.

The sexual history should include the patient's marital history, his wife's desire for or avoidance of intercourse, and the existence of extramarital partners. A detailed history of the erectile failure should be obtained. Organic impotence not caused by surgery or drugs typically appears gradually with a transition phase during which the man can obtain only a partial or short-lived erection. Orgasm and ejaculation are usually normal, although patients with diabetes may have retrograde (dry) ejaculations. Psychogenic impotence typically has a sudden onset and tends to be situational. For example, the man may have a sustained erection during foreplay or masturbation but be unable to complete the sex act with a partner. Inquiries into the patient's occupational and work-related stress are also in order.

The physical examination should include examination of the breasts for gynecomastia (suggestive of hyperprolactinemia), palpation of the peripheral pulses, and genital and rectal examinations, including neurologic tests, especially anal-sphincter tone, perineal sensation, and bulbocavernosus reflex.

It is often possible at this point to state whether the impotence is psychogenic or organic and, if the latter, what the cause is. One must not be hasty, however; the patient with diabetes may have psychogenic impotence, and the patient with psychiatric disease may have organic impotence. The standard method of distinguishing between psychogenic and organic impotence is to determine whether the patient has erections during sleep. Invariably such erections occur in the man whose impotence is psychogenic, whereas they often do not occur if the impotence is organic. Nocturnal penile tumescence (NPT) can be ascertained with a strip that is wrapped around the penis at bedtime (Snap-Gauge band) or, less accurately, with a strip of postage stamps.⁷ This method is not entirely fool-proof, as a man with venous-leak impotence may "pass" the NPT test. A more refined method measures both the circumference and rigidity of the penis at both the base and tip (Rigi-Scan). In some sexual dysfunction clinics, evaluation is speeded by combining Rigi-Scan measurements with penile papaverine injections.

If organic impotence is the diagnosis, and the cause is not obvious, it is wise to rule out significant systemic disease. Urinalysis, fasting and postprandial blood glucose measurements, liver and renal function studies, and assays of serum testosterone and prolactin are indicated in most patients. Normal values for serum testosterone and prolactin vary among laboratories depending on the method and commercial kit used. More sophisticated tests that may be appropriate include Doppler measurements of penile blood pressure to determine arterial adequacy, electromyographic measurement of sacral reflex latency to assess neurologic integrity, and dynamic cavernosography to assess venous competence. In rare cases, angiography is performed.

MANAGEMENT OF ORGANIC IMPOTENCE

Some impotent men are satisfied if the medical evaluation shows no serious illness and desire no further treatment, but most do desire treatment. Fortunately for these men the therapeutic options have improved greatly over the past 15 years.

Medical Treatment

For men with medication-induced impotence, a change in medication usually gives good results. Hypogonadism is well treated with testosterone cypionate (Depo-Testosterone) injections every two to three weeks. Hyperprolactinemia secondary to pituitary tumors is treated with bromocriptine or surgery with good results. Medication-induced hyperprolactinemia may be managed by changing medications.

Injections of papaverine or a mixture of papaverine and phentolamine directly into the corpus cavernosum of the penis will provoke an erection in all potent and

many impotent men.⁸⁻¹⁰ These drugs are inexpensive, (about \$1 per injection depending on the dose) and are available in hospital pharmacies. Most men find that the injections are easy to administer, especially those men already using insulin. Because there is a 2 to 4 percent incidence of priapism with papaverine-induced erections,^{8,9} patients utilizing them should be followed by a urologist skilled in the treatment of that potentially serious complication.

Mechanical Treatment

A penile-suction pump* is a simple and inexpensive device that will create an erection in most men.¹¹ A lubricated cylinder is placed over the penis and the air is drawn out with a hand-held pump, creating an erection. A rubber band is then placed at the base of the penis to retard outflow of blood and the device is removed. Petechiae are common, but serious complications are very rare.

Surgical Treatment

Although microsurgical revascularization can reverse impotence secondary to atherosclerosis, and dorsal penile vein ligation has been employed in patients with impotence secondary to venous leak, success is not uniform.¹²⁻¹⁶ The mainstay of surgical treatment of impotence is the penile prosthesis, two cylinders implanted, one in each corpus cavernosum. Several models are available. The semirigid prostheses remain firm all the time, although most have either a hinge or a malleable core to allow concealment. The multicomponent inflatable prostheses consist of two inflatable cylinders connected by tubing to a reservoir that is placed suprapubically and a pump that is placed in the scrotum beside one testicle. The recently introduced, self-contained inflatable prostheses have the pumps and reservoirs within the cylinders themselves, decreasing the complexity of the implantation operation and the risk of mechanical problems that could require reoperation. The rigid prostheses are the most reliable types, with complication rates of less than 10 percent, and they virtually never require replacement for mechanical problems.¹⁷⁻²³ The multicomponent inflatable devices provide both the most natural erections and the best flaccidity but at the expense of slightly more complex surgery and a greater risk of mechanical failure. All prostheses have a small risk of infection. Although in some series a very low rate of revisions have been required with the newer multicomponent inflatable devices,²⁴⁻²⁷ in others there have been reports of complications and revisions of over 40 percent.²⁸⁻³⁰ Costs of prostheses vary among different manufacturers and hospitals. Prostheses at the St. Paul-Ramsey Medical Center hospital cost

* The Erect-Aid System, currently priced at \$265, is available by prescription from NPI, PO Box 1478, 1246 Jones St., Augusta, GA 30903.

\$1,075 to \$3,000 depending on the manufacturer and the model.

MANAGEMENT OF PSYCHOGENIC IMPOTENCE

In some cases, particularly when performance anxiety appears to be the cause of impotence, the temporary use of the penile-suction device or penile papaverine injections may restore potency. In most cases, sexual counseling is the treatment of choice. Sexual counselors, usually psychologists or psychiatrists, specialize in counseling impotent men, but many primary care physicians and urologists are capable of providing appropriate counseling. Surgical implantation of a penile prosthesis is rarely, if ever, indicated in the treatment of psychogenic impotence, as these devices destroy the erectile tissue of the corpora, making future erections impossible without the device.

THE FAMILY PHYSICIAN AND UROLOGIST

The family physician should be able to take an active role in the evaluation and management of impotence. Given his or her preexisting knowledge of the patient, the family physician is in an ideal position to obtain a relevant history, perform appropriate physical examination, and order appropriate laboratory testing. If it is unclear whether a man has organic or psychogenic impotence, a referral to a urologist for nocturnal penile tumescence monitoring is usually required.

Impotent men who desire penile papaverine injections or penile prostheses require referral to a urologist. They should be followed regularly by a urologist after injections begin or for several months after prosthetic surgery. Treatment with a penile-suction pump or sexual counseling may be performed by the family physician. Men who need a change of medication or hormonal therapy are perhaps best treated and followed by their family physician. Referral to a urologist is necessary only if these treatments are unsuccessful.

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Addendum

Since revision and acceptance of this manuscript, Eli Lilly and Company has added to their package insert a statement that papaverine is not indicated for treatment of impotence by intracorporeal injections. Many urologists continue to offer papaverine injections to their patients, but only after carefully explaining that this is not an approved use of the drug. Other urologists no longer offer these injections. Research is underway on the use of other medications for intracorporeal injection for treatment of impotence.